

# FLIGHT

*The*  
**AIRCRAFT  
ENGINEER  
&  
AIRSHIPS**

**First Aero Weekly in the World**

**Founder and Editor: STANLEY SPOONER**

**A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport**

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## Flight

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### DIARY OF FORTHCOMING EVENTS

*Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—*

|                     |  |
|---------------------|--|
| <b>1925</b>         |  |
| <b>Mar. 5</b> .. .  | Lieut.-Col. C. B. Heald, C.B.E. (Medical Adviser to the Director of Civil Aviation, Air Ministry): "Some Medical Aspects of Air Transport," before R.Ae.S. |
| <b>Mar. 6</b> .. .  | M. E. Dewoitine: "The Advantages of Metal Construction," before I.Ae.E.  |
| <b>Mar. 11</b> .. . | G. Bradshaw, Esq.: "The Failure of the Petrol Engine as a Prime Mover."<br>Presidential Address. Election of Officers.<br>Before C.U.Ae.S.                 |
| <b>Mar. 14</b> .. . | R.A.F. (India) Reunion Dinner.   |
| <b>Mar. 19</b> .. . | Capt. F. Tymmus: "Practical Navigation of Aircraft," before R.Ae.S.  |
| <b>Mar. 23</b> .. . | Entries close for Schneider Cup Race.  |
| <b>Mar. 25</b> .. . | Royal Aero Club Annual General Meeting.  |
| <b>Mar. 26</b> .. . | Dr. Eckener (Managing Director, Zeppelin Airship Co.): "Modern Zeppelin Airships," before R.Ae.S. (Society of Arts).                                       |
| <b>Mar. 30</b> .. . | Royal Aeronautical Soc. Annual General Meeting.  |
| <b>Apr. 8</b> .. .  | Visit (Details announced later).   |

## EDITORIAL COMMENT.



VERY great deal, quite possibly a great deal more than one can realise at the moment, may depend upon the decisions made and the action taken by the Air Ministry during the next few weeks on the subject of light 'planes. If the right course is followed we believe that 1925 will go down in history as marking the real beginning of popular aviation. A false step may easily result in retarding progress and render the work of the last few years futile.

### A Wonderful Opportunity

We may truly be said to be at the parting of the ways, and if we follow the wrong road the delay may be far-reaching. The position is already well known to readers of FLIGHT, and there is little need to go into details concerning the development of the light 'plane during the last couple of years. Put very briefly the whole history may be summed up telegraphically as follows: Rhön gliders, 1921-22; Itford gliders, 1922; Lymington light 'plane single-seaters, 1923; Lymington light 'plane two-seaters, 1924. Logically the next entry should read: Lymington "not-quite-so-light 'planes," 1925, and from all indications that is what is about to happen. In a way it is deplorable, as it seems to indicate the burial of an ideal, but those of us who have followed flying since its beginning have had to bury a good many ideals. There is surely nobody who can fail to regret that the ideal which we had set ourselves: that of flying small aeroplanes with engines of really low power, should have been found unattainable. Technically it has been demonstrated that, whatever official statements to the contrary, it is possible to fly with very small engines, but it seems to be an incontrovertible fact that as the size of the engine decreases so the cost of the machine increases.

This is, of course, to be expected from first principles, since a reduction in weight entails much greater care in design and workmanship. The English Electric Company's "Wren," with 400 c.c. A.B.C. engine, flew extremely well at Lymington in 1923, and really, in spite of its almost ridiculously small engine, had quite a good power reserve. The machine was, structurally, an extraordinarily clever piece of work,

and the weight had been reduced to a wonderfully small figure. The Hawker two-seaters of last year were equally remarkable for low structure weight, but, and this is the crux of the matter, both types were comparatively expensive to build, and it is difficult to see how, in machines where every ounce counts, the cost is ever to be materially reduced. One is, therefore, almost forced, regrettable as is the fact, to the conclusion that for our immediate needs at any rate, we shall have to attack the problem from the other end, so to speak, and start with an engine which is, perhaps, a good deal larger than one could have wished for, but which has the all-important advantage of being of low cost and giving a good power reserve. The fact has to be faced that no matter how excellent engines and machines we may turn out, if the combination results in being too costly, nobody, or at any rate but a very small number, will buy them. That being so, the thing to do seems to be to aim at the lowest possible cost, compatible with structural strength and good reliability, and then to give the best quality possible at a figure that is commercially attainable. The de Havilland "Moth" described in this issue of FLIGHT is the first tangible result of such a policy, and there is no denying the fact that a very serviceable little machine has been produced. We include in these remarks the "Cirrus" engine, which alone has made the "Moth" possible. The engine, judged on a capacity rating, is a large one, and there will probably be those who maintain that the machine cannot be classed as a light 'plane. Very possibly not. We know that there are in use in Germany today commercial machines with very little more power carrying pilot and three passengers. But the "Moth" is definitely a *practical* machine. The demonstration at Stag Lane on Monday last was in one sense hampered by the deplorable condition of the aerodrome, which was nothing but a quagmire, but on the other hand it did serve to demonstrate the ability of the machine to get off from a very bad piece of ground. We have nothing but praise for the Lympe light 'plane two-seaters of last year, but there is no denying the fact that precious few of them, if any, would have got off with two people on board from Stag Lane under Monday's conditions. Thus, it was demonstrated that the "Moth" has ample power reserve to enable flying to be done under quite bad conditions, and if the light 'plane is to be a practical proposition, it will have to be capable of flying in all sorts of weather and take off from and alight in fields and grounds far removed from the "billiard table" quality.

This much having been demonstrated, the next consideration is that of price. We do not know what the de Havilland Aircraft Company intends to charge for the "Moth," and it seems doubtful whether any definite figure can be quoted at the moment, as much will obviously depend upon the number of orders received. It does, however, appear probable that if built in batches of 50 or so, the machine could be produced to sell at about £500. A really practical aeroplane at £500 would undoubtedly be a selling proposition, not only to light 'plane clubs but to private owners at home and in the Dominions. The future will show whether sufficient numbers are ordered to render this figure possible.

It is rumoured that for this year's light 'plane competition a weight basis will be employed instead of the capacity basis of previous years. While this is a step in the right direction, it does not, in our

opinion, take us far enough. After all, what does it matter what is the size (within reason) of machine and engine? The one predominant factor is cost, and if a larger machine can be produced, with the required performance, at a lower price than the smaller machine, why should it be ruled out on account of its size? May we, therefore, earnestly recommend to the attention of those responsible for drafting the rules for our next competition (we are not very optimistic as regards sufficient numbers being entered this year) that the question of price be studied first, last and all the time. Presumably some sort of formula will be devised for the competition, and we would urge that in this formula be incorporated a factor placing a premium on price. It was, we believe, Sir Henry White Smith who suggested, on the occasion of Major Buchanan's paper on light 'planes before the Royal Aeronautical Society, that entrants for the next competitions should be asked to state the price at which they were prepared to sell their machine. That, we think, is a wholly excellent suggestion, and we do think it should be very seriously considered. That there will be certain difficulties is obvious, but they should not be insuperable. And the formula should be so adjusted that the number of marks for low price formed a large percentage of the total, always provided that the quality and performance of the machine were up to a reasonably high standard. We realise that the decision of what constituted this standard would be a somewhat difficult one, but it should be possible.

The importance of the light 'plane movement can scarcely be exaggerated, and no effort should be spared to make it a success. In this connection we would call attention to some very valuable suggestions revived by Brigadier-General Warner in the course of the debate on the Air Estimates. He doubted whether, on the reserve side, the formation of light 'plane clubs would meet our needs for pilots, and called attention to the large field for expansion represented by our universities and public schools. It is a regrettable fact that hitherto flying has not been taken up by universities and public schools as have other forms of sport, and if means could be found to get them interested a great deal would have been accomplished. General Warner's suggestion that the heads of these institutions should be approached with a view to the formation of university and public school light 'plane clubs is worth serious consideration, and it is not difficult to imagine the interest that would be aroused by inter-club races and competitions. A small start in this direction was made at Hendon when we had inter-university races between pilots mounted on S.E.5's, and the light 'plane type would appear to offer great possibilities of extending and improving upon that small beginning. It is precisely among the public school boys and university undergraduates that the right kind of young man is to be found, and as General Warner said, the heads of universities and public schools would probably be willing to meet in conference to consider the question. The Air Ministry can help a good deal by taking a sensible attitude, but we are not very optimistic that it will do so. A lecture given recently by a highly-placed official did not seem very promising, and the tone of its delivery was too much stamped by the "we alone know" attitude of certain technical departments. However, there is now an excellent opportunity, and we shall see whether the Air Ministry is broad-minded enough to grasp it.





THE DE HAVILLAND "MOTH" : Three-quarter front, side, and three-quarter rear views, and, insert the machine in flight.

# THE DE HAVILLAND "MOTH"

## 60 H.P. "Cirrus" Engine

From whichever point of view one regards it, the de Havilland "Moth" must be considered a very fine little aeroplane. It may be argued that it is not a light 'plane, in the sense of the term that has come to be commonly accepted, but it is a low-power aeroplane with a good performance, and it is hoped to be, although naturally this still has to be proved, one

enable the machine to be put down in a small field. Altogether, therefore, if orders are forthcoming in sufficient numbers to allow of placing it on a production basis, one can foresee a very bright future for the de Havilland "Moth." There is still the question of the Air Ministry airworthiness certificate, but we understand that the second machine, now nearing completion, is being built under A.I.D. supervision, and that, therefore, the type may confidently be expected to be "approved."

On Monday of this week the De Havilland Aircraft Co., Ltd., had invited a number of press representatives to visit the Stag Lane works in order to inspect the "Moth" and to watch it flying. The aerodrome was in a deplorable condition after the incessant rains, and the "Moth" sank in up to its axle in the mud, but for all that it got off with a relatively short run, and, once in the air, the climb was extremely good. A large number of passengers were carried, and incidentally the visitors were, probably quite unconsciously, paying a tribute to the "Cirrus" engine by waiting their turn for a "flip," the thought never occurring to them that the engine might refuse work.

We were among the passengers carried during the day, and perhaps a few impressions may be of interest. The machine got away very well, and once off, Mr. Broad, the well-known de Havilland test pilot, climbed her at 1,800 r.p.m. and an air speed of 50-55 m.p.h., at which speed she rapidly gained height. The day was somewhat bumpy, but the "Moth" appeared to rise and fall on an even keel, and no tendency to pitching was observed. In a series of steep curves it was observed that the amount of aileron movement was very small, an indication that, although only the lower plane is fitted with ailerons, lateral control is ample. In normal straightforward flying the ailerons were used surprisingly little, the large dihedral evidently being sufficient to give good stability, yet not so large as to make the machine "wallow." As there was no control stick fitted in the forward cockpit we were not able to ascertain how much elevator control is required, but observation from the ground did not reveal any large movement in ordinary manoeuvres. The rudder bar in the forward cockpit moved very little indeed,

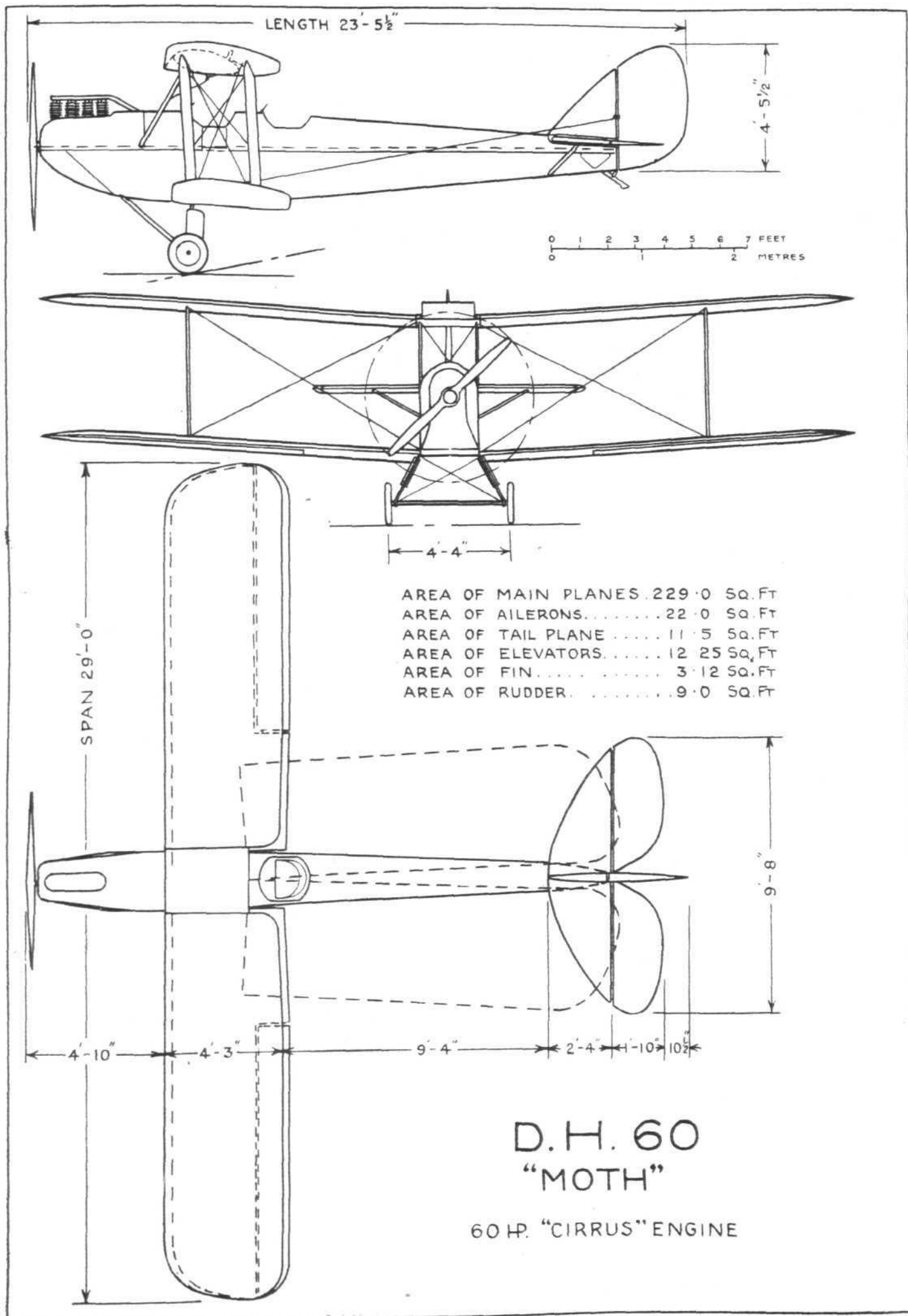


**THE D.H. "MOTH":** View showing undercarriage and mounting of the "Cirrus" engine. In the next machine the exhaust pipe will be on the port side.

of the most reliable little machines of modern times. In fact, the first aim of the designers of machine as well as engine has been this particular feature. The engine, the Aircraft Disposal Company's "Cirrus," described and illustrated in *FLIGHT* last week, is of fairly large capacity (4,500 c.c.), and is capable of flying the machine quite strongly without being run at its maximum permissible "revs." This, naturally, means that there is a good power reserve to enable the machine to take off from a reasonably small field, so that the "Moth," as the new machine is called, will, both on this account and also because of the fairly high top speed which enables headway to be made against a head wind, be well suited to cross-country flying or touring. In fact, the "Moth" is distinctly more than an "aerodrome machine" (i.e., an aeroplane mainly used for short flights in the vicinity of an aerodrome), and should, provided the reliability proves as good as expected, be extremely useful for a variety of purposes. The designers naturally hope that it will be adopted for use by the light 'plane clubs, as it is particularly suitable for school work and "joy-riding," but one can foresee a number of other uses to which the "Moth" can be put. As a fairly low-priced machine for the owner-pilot the type should have much to recommend it, especially as its construction is of the simplest and most straightforward, while the "Cirrus" engine is so much of the motor-car type that anyone with motor-car experience should easily be able to look after it. Moreover, the engine has been designed to give very long service without overhaul, so that the maintenance should be well within the capabilities of the average motorist. Then there is the question of the employment of low-power aeroplanes in the Dominions. Here, also, the "Moth" should be extremely useful, as its performance enables it to fight adverse weather conditions, while its landing speed is low enough to



**THE D.H. "MOTH":** This photograph shows the arrangement of the cockpits. Note also the gravity petrol tank on the top centre-section.



THE DE HAVILLAND "MOTH," : General arrangement drawings, to scale.



so that presumably the large rudder is very effective, and should help very materially to give control at or near the stalling angle.

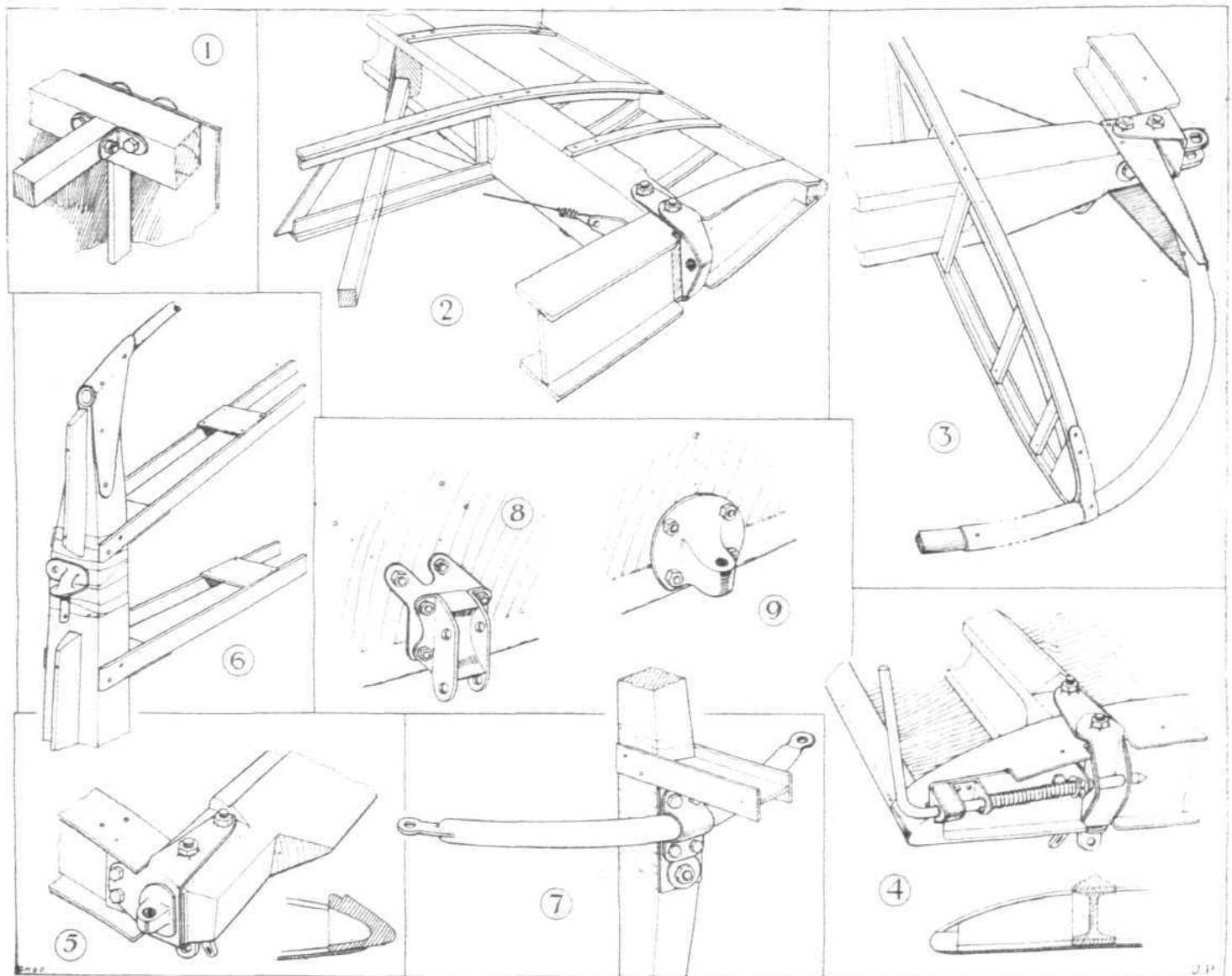
The front cockpit proved most comfortable, and by keeping one's face fairly close to the wind screen no appreciable draught was felt, and it was found unnecessary to wear goggles. As soon as one attempted to look over the side, however, the wind was felt, and probably a slightly wider wind screen might be an improvement. The "Cirrus" engine had a most reassuring note, and at no time did one have the slightest idea that it was likely to stop or to give any trouble at all. There was a very marked absence of vibration, and altogether the "Cirrus" sounded and ran more like a "six" than a "four." The noise was very slight, certainly not sufficient to produce that "deafness" which sometimes accompanies sitting behind a larger engine, but it seems likely that still more can and will be done to make the engine even more silent. When throttled down to land it was wholly delightful to float into the aerodrome at about 30 m.p.h. ground speed. One had the feeling that there was plenty of time to think things over and to decide exactly where to land, and we fancy that when used as a school machine, this feature will be found a most valuable one, as it can scarcely fail to inspire pupils with confidence.

At the moment it has not been possible, owing to the unsettled weather, to carry out proper performance tests with the "Moth," but preliminary tests seem to indicate that the top speed will probably be roughly 90 m.p.h. (144 kms. h.), and the stalling speed about 38 m.p.h. (61 kms. h.). The

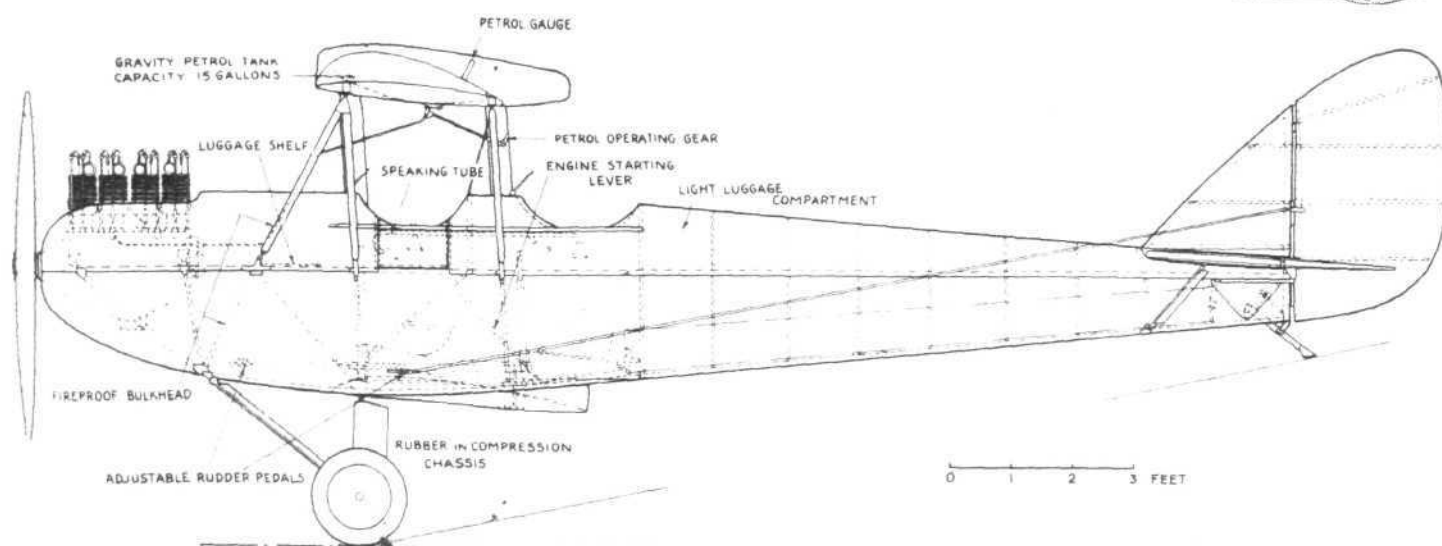
manœuvrability appears excellent, and on Monday Mr. Broad repeatedly looped the machine, as well as doing Immelmann turns and spins.

With these general remarks on the "Moth," we may turn to a more detailed description of the machine. Simplicity and robustness are the main features of the de Havilland "Moth," or D.H.60, to give the machine its official type designation. The number of fittings used, for example, has been reduced to an absolute minimum, and such few as are employed are of very simple form, cheap to manufacture and not likely to require much attention during use. The fuselage, for instance, is a box composed of four longerons, straight plain vertical and horizontal struts, and the whole covered with sheet ply-wood. This type of construction has now been employed for many years by Capt. de Havilland, and has stood the test of time. In actual use it stands up well to fairly rough handling, and at the same time it is a form of construction comparatively cheap both in small numbers and in large quantities. The sides and bottom are flat, but the top is deeply cambered. The struts in sides and bottom are not directly attached to the longerons, but are held in place by the three-ply covering, whereas the top (which is, of course, open under the fairing) has its struts secured by angle brackets and bolts to the top longerons, as shown in a sketch.

The two cockpits are arranged in the usual fashion, that at the rear being normally intended for the pilot, although when dual controls are fitted the machine can, of course, be flown from either cockpit provided the machine is trimmed by carrying a passenger, or equivalent load, in the rear cockpit.



THE DE HAVILLAND "MOTH": Some Constructional Details—1. The only metal fittings, attachment of top cross-struts to top longerons. 2. Details of wing construction and spar fitting of top plane. 3. Rear top spar with fitting, etc.; the rounded corner is in the form of an aluminium tube, flattened to meet the wooden trailing edge. 4. Front spar fitting of top centre-section, with quick-release for folding of wings. The gravity petrol tank rests on the centre-section spars. 5. Rear spar of top centre-section, with hinge fitting for folding. 6. Top of rudder post, showing hinges, ribs, and metal trailing edge. 7. Rear view of rudder, with plain tubular rudder crank. 8 and 9. The very simple wing fittings on the lower longeron of the fuselage. The wings, of course, pivot on the rear spar fitting, and the locking device on the front spar is similar to that shown in 4.



THE DE HAVILLAND "MOTH": Side elevation, showing fuselage details, etc.

From the side elevation and photographs it will be seen that the view from the rear cockpit is very good, and we can personally testify to the excellence of the view from the front cockpit. The seat is comfortable and the cockpit exceptionally roomy for such a small machine. It is intended to fit a speaking tube in the cockpit, so as to facilitate communication between pilot and passenger or pupil. On the first machine this had not yet been fitted, but we understand that it will probably have been installed by now. Access to the front cockpit is facilitated by a small door in the coaming, which allows of stepping from the lower plane into the cockpit without any great difficulty. When closed the door is kept in place by a simple spring-loaded bolt, which can easily be withdrawn by the passenger himself.

The undercarriage is of the plain V-type, with the rear "legs" in the form of telescopic tubes sprung by rubber blocks working in compression. The rubber is enclosed in a cylindrical metal casing, so that the light is kept away from it, and it should thus last almost indefinitely. The travel on the legs is not long, some 4 ins. or so, but appears to be ample, and the machine displayed not the slightest tendency to bounce. Of course, pupils cannot be expected to make landings like those made by Mr. Broad, but it seems likely that even in the hands of a novice the "Moth" should not be difficult to land.

The "Cirrus" engine has its four "feet" resting on the top longerons, which are specially strengthened for the purpose, and a very neat cowling surrounds all but the top of the cylinders. In the first machine the exhaust pipe is crossed over the top of the fuselage, to run along the starboard side, but in subsequent machines it will run straight down along the port side, and the door to the front cockpit will be to starboard. The two long breather pipes of the crank-case are hidden inside the engine cowling, and help materially to keep the machine clean. The oil-filler cap, incorporated with the breather pipes, projects through the cowling, and thus allows

of replenishing the sump without disturbing anything. The carburettor is placed on the side, above the cowling, where, in case of a backfire setting any small quantity of petrol on fire, it is removed from any inflammable part of the machine, and is, moreover, exposed to the rush of air. A small metal shield serves to prevent the carburettor from getting too cold. The petrol supply (15 gallons normally) is carried in the gravity tank on the top centre section, and there are thus no petrol pumps to get out of order. The oil is carried in the sump of the engine. The petrol carried in the standard tank is sufficient for about 5 hours at cruising speed, or something like 325-350 miles. It is, however, of interest to note that if the machine does not carry a passenger, and a petrol tank is built into the fuselage, the petrol capacity can be increased to suffice for about 12 hours' flying. A hand-starter, operated by a lever in the pilot's cockpit, enables the engine to be started without outside assistance, as was repeatedly demonstrated on Monday last by Mr. Broad.

The wing construction is extremely simple, with I-section spars, spindled out from the solid, and with very simple ribs. The wing bracing is in the form of streamline wires, and there is but one pair of inter-plane struts on each side. The wings have been designed to fold, an operation occupying but a few minutes, and in the folded state the machine only occupies a width corresponding to the span of the tail plane, or approximately 9 ft. Ailerons are fitted to the bottom plane only, in order to make them more accessible, but the lateral control appears to be sufficient. The ailerons are hinged at the top of the spar, instead of on the centre line, and thus it has been possible to cover the gap between wing and aileron with a fabric strip.

A detailed weight specification is not available, but we learn that the weight of the machine empty is 764 lbs. Allowing 160 lbs. each for pilot and passenger, about 60 lbs. for luggage and 100 lbs. for petrol, the total loaded weight should thus be in the neighbourhood of 1,250 lbs.

## PERSONALS

### Married

MR. WILLETT AMALRIC BOWEN-BUSCARLET, R.A.F., only son of Mr. and Mrs. F. C. Buscarlet, of Newcastle, was married on February 21, at the Parish Church, Marwood, Barnstaple, to Miss VIOLET MARY, eldest daughter of the late Mr. J. M. MONTAGUE and of Mrs. Montague, of Broom Hill, Barnstaple.

Flight-Lieut. H. W. EVENS, R.A.F., eldest son of Mr. and Mrs. Evens, of Westcliff-on-Sea, was married on February 21, at St. Pancras Church, London, to JEAN, youngest daughter of Capt. and Mrs. RALPH WHITEHEAD, of Blyth, Northumberland.

Capt. HERBERT GEORGE POWELL REES (late R.A.F.), son of Mr. and Mrs. H. Powell Rees, of Ealing, was married at Birmingham on February 28, to OCTOBERA NERQUISE, youngest daughter of Mr. and Mrs. J. M. EDWARDS, of Brooklands Terrace, Swansea.

HORACE BOWYER SMITH, D.F.C., eldest son of Mr. and Mrs. A. G. Smith, of Bath, was married on February 23, at Burley-in-Wharfedale Parish Church, to JOAN ALSTON CRESSWELL, fourth daughter of Lionel Cresswell, J.P., C.A., and Mrs. Cresswell, of The Hall, Burley-in-Wharfedale.

WILLIAM SHAW, eldest son of the late Mr. and Mrs. George Shaw, Leigh, Lancs., was married on February 23 at St. James's Church, London, W., to SADIE ELIZABETH, only daughter of Mr. and Mrs. George BAKER, Royal Air Force Cranwell, Lincs.

The Rev. VIENER, C.B.E., M.A., K.H.C., Chaplain-in-Chief, R.A.F., was married on February 23, at Christ Church, Mayfair, to VIOLET MARGARET, second daughter of Mr. and Mrs. P. E. F. KEATCH, of Twickenham and India.

The marriage took place on March 2 very quietly at St. Mark's Church, Torquay, of Maj. R. C. BURTON, late Cent. India Horse and R.A.F., and MAUD, daughter of Maj. and Mrs. SEWALLS WINTER, and grand-daughter of the late Lieut.-Col. H. B. Winter, of Drayton, Norfolk.

### To be Married

The engagement is announced of Capt. F. ROY WALKER late Middlesex Regt., and R.A.F., and PATTY DEVEREUX HICKMAN, younger daughter of Mr. and Mrs. Claude Hickman, late of Bickley, Kent.

# OUR AIR POLICY

## Sir Samuel Hoare's Speech in Commons

IN his speech on the Air Estimates in the House of Commons on February 26, Sir Samuel Hoare outlined the Air Policy of the present Government, and below will be found extracts giving such of the points raised as appear to us to be of especial interest. Sir Samuel Hoare said:—

In the first place, in accordance with the expressed desire of every party in this House—and I do not think there has ever been such unanimity amongst the leaders of all parties upon any question of defence—we are carrying through a programme of trebling the combatant strength of the Air Force as compared with its strength at the time at which I last came into office. Secondly, we have almost reached the limit of our war stocks, and as a result have been forced more and more to buy new equipment in the market. This latter feature, whilst it will undoubtedly help the British aircraft industry, is very serious from the point of view of the taxpayer for it means a heavy financial demand for re-equipment and replacement simultaneously with the big financial demand due to the expansion. Moreover, machines and engines and spare parts are constantly rising in cost. I have here a list of some of these rises, and I find that many of the new types of machines and engines both here and in France are costing about 100 per cent. more than the old types.

### Air Power and National Security

Year after year the Minister who introduces these estimates emphasises the magnitude of the revolution that has been brought about in the problem of home defence by the development of air power. To a country like ours that has never maintained a large army in peace time, and has until the last few years depended upon the sea and the Navy for practically its sole defence against invasion, this new revolution probably means more than to any other country in the world. The central and undeniable fact is what matters, and the central fact is that air force, passing in a few minutes over trenches and armies and channels and fleets, can penetrate into the heart of this country, and, whatever may or may not be the material damage that it creates, make life unendurable for a population that lives mainly in great towns.

So far as we are ourselves concerned, we are in the particularly fortunate position of being surrounded by old friends and allies, and we need not, therefore, fall into any panic or adopt exaggerated measures for developing a scheme of defence that, however remote may be the possibility of danger, is none the less necessary to our national security and status. Let us not, therefore, brood morbidly over remote perils, but let us rather take a healthy and sustained interest in a problem of defence that must be faced even in the most tranquil times by any great empire.

### Programme of Home Defence

When I took office two years ago there were upon a liberal calculation only three squadrons available for home defence. There are now six times as many, and in the course of 1925-26 the existing number of 18 will be increased by a further eight. Apart from the question of numbers, there are three other features to which I wish to draw the attention of hon. members. In the first place, we are equipping the Regular Squadrons that are being formed with really up-to-date machines. The reason is obvious, for the difficult conditions of a sudden air attack the essential need is that our fighting pilots and machines should be the very best that we can obtain. It is skill and training and performance, perhaps even more than the number of machines, that are the three essentials of every sound home defence programme. Hon. members will, therefore, be glad to hear that of the 18 Regular Squadrons already formed 15 have now been equipped with post-War types of machines.

Secondly, I desire to draw the attention of the House to the fact that we are introducing into our scheme for the first time in the history of military aviation, non-Regular units—namely, four auxiliary Air Force Squadrons and, as I now hope, two Special Reserve Squadrons, instead of the one foreshadowed in the memorandum recently issued with Air Estimates.

The Special Reserve Squadrons, as the House will remember, will be organised on a cadre basis, with one flight manned by Regular personnel and the other two flights by non-Regular Special Reserve personnel—that is to say, personnel liable for peace time training and embodiment in time of emergency. One of these squadrons will be formed near London and another at Aldergrove, near Belfast. As to the Auxiliary

Air Force Squadrons, there will be a small permanent staff of Regular personnel, but the main body of the personnel will be upon a Territorial basis. I have decided to locate the first four of these squadrons, two in London and one each at Edinburgh and Glasgow. I may add that in addition to the non-service personnel in these types of non-Regular squadrons, we are trying another experiment in the Regular squadrons in which we are introducing a number of civilians who will carry out the greater part of the less technical non-flying duties. The House, will therefore, see that both in the matter of non-Regular personnel and in the matter of the employment of civilians, we are making a completely new experiment in the field of air defence. I hope that the experiment will succeed, for its success will mean not only a considerable saving in expense, but, what is even more important, a diffusion of the knowledge of flying and air defence amongst a number of citizens, and in various parts of the country, where little is at present known of either. I can at any rate say that the Territorial Association and the districts where it is proposed to place these squadrons, have cordially welcomed the scheme and declare themselves most anxious to make it a success.

Lastly, we have now introduced unity of command into the field of Home Defence against air attack. An Air Officer Commanding has been appointed to this post, and it will be his duty to take operational control over all our air defences in any air operations. This does not mean that the Air Ministry will be in administrative control of the Anti-Aircraft units on the ground. I have myself never desired to overweight and complicate the duties of the Air Force with the administrative control of an unnecessary number of non-flying units. All that is needed is that there should be the closest co-operation between the Army and the Air Force in the matter of training, and that so far as operations are concerned there should be unity of command under an Air Force commander.

We shall take four or five years to complete the first stage of our programme, for in a time of complete peace I have not at present felt justified in asking the House of Commons for greater expenditure, nor without further compulsory powers for buying aerodromes, and without generally dislocating the normal life of the country, could I greatly expedite the programme.

If, then, I may sum up this, the most important phase of air policy, I would claim that we are working upon a sound basis, that our programme is proceeding surely, although it may be slowly, and that at the end of 1925-26 we shall have formed half the 52 squadrons that are needed at this stage, and shall to that extent be in a much stronger position than we were when last I stood at this box two years ago.

I shall value the opinion of the House upon the broad policy that we are pursuing. On the one hand, there is the undeniable fact that from the point of view of Home Defence we are still in a position of numerical inferiority as compared with the greatest European air power of 1 to 3, and that it will take several years to bring up to anything like the same numerical strength. On the other hand, there is the fact that this great power is our old friend and ally, and that no sane Frenchman or Englishman contemplates at the present time the possibility of strained relations between our two countries.

### Mobile Defence of the Empire.

I pass from the question of the Home Defence of these shores to the wider question of Empire defence. Whilst I do not wish to make any claim that cannot at present be sustained, I would ask hon. members to keep constantly in their minds the great potentialities of air power for Empire defence. If we could succeed in putting our Empire defence upon a more mobile basis, might we not save both large numbers of men and great sums of money? Let me give the House a single instance of our mobility during the last year, and it will incidentally disprove the charges of hon. members opposite that air operations always mean bombing. In May of this year, serious disturbances broke out at Kirkuk between the native forces. Within eight hours of the receipt of the first report of the trouble a small contingent of the Inniskilling Fusiliers had been flown to Kirkuk from Baghdad, a distance of 150 miles, and within two days a total of 145 officers and other ranks, had been similarly conveyed by air, with rifles, equipment, blankets, and full marching order. To reach Kirkuk by ground communication would have entailed a 12-hour railway journey and a four-days' march.



The arrival of the aeroplanes and troops instantly restored peace. If further testimony is needed of the efficiency of this new form of mobile defence, it would be found in the fact that the Air Officer Commanding, Air Vice-Marshal Higgins, is ready to reduce still further this small garrison, even though the Northern frontier is not yet definitely settled. I suggest to the House that this experiment in mobile defence is of great importance in helping us to solve the problem of defending a vast Empire at a period when we are short both of men and of money. It is an experiment that will become even easier to apply when airships, capable of transporting two or three hundred men, and aeroplanes and aeroplane supplies are, as we hope, developed and still further increase the mobility of Empire Defence.

### Science and Safety First

In the air battle of the future it is the man of science, whether he be working in the Government service or whether he be working in the universities and laboratories of the country, who will have as much to do with success as the most brilliant pilot or the most highly-trained air staff officer. It is on this account that the research policy of the Air Ministry and the money that is devoted to it are of such paramount importance to the future of British air power. I admit that in the financial stringency of the last few years it has been impossible fully to satisfy the legitimate demands of research, and I take full blame to myself for any sins of omission of which I may have been guilty in this respect. At least I have made an attempt to set on foot an organisation that will give it freer scope, at least I have been at great pains to consult the leaders of the world of science as to the wisest course to pursue, and, although I recognise the fact that we have only scratched the surface, more research work is being carried out now than at any time since the War, and more still will be carried out in 1925-26.

The Research Department of the Air Ministry, the Royal Aircraft Establishment at Farnborough, the Aeronautical Research Committee and many men of science throughout the country are constantly engaged upon problems which are not always as straightforward as they might seem. For the House will realise that we have to take into account possible reactions in other directions. I wish to see this work greatly developed, for here in Great Britain we have perhaps a greater scientific capacity than any other country in the world. Realising the immense importance of the help that these men of science can give us in making flying safer and in making air power more efficient, I shall certainly do my utmost to bring to the help of our splendid pilots and mechanics the incomparable brains of British men of science.

### Civil Aviation and Light Aeroplane Clubs

The field of research is naturally the common territory between military and civil flying, and I pass from the atmosphere of bombers and fighters to the more peaceful atmosphere of civil training and civil transport. As to the training schools, the schools, as the House will remember, for training reserve pilots for the R.A.F., hon. members will be interested to hear that the experiment of giving pilots in civil life refresher courses in civilian training classes is proving successful, and that we hope this year to raise the number of reserves from 510 to 725. This experiment is, however, not altogether new, for it started when I was last in office. The novelty of this year is the starting of a certain number of Light Aeroplane Clubs. The two flying meetings that have been held at Lympne have shown the great potentialities of light aeroplanes. For there we have seen machines with motor-bicycle engines so small as to be capable of being dragged through a gate, flying 70 or 80 miles an hour and remaining for long periods in the air. There have been two difficulties to surmount in starting these clubs, the difficulty of finance and the difficulty of finding a suitable engine for a dual control machine. I believe that we have now surmounted the financial difficulty, and that we have arrived at a basis that will make it possible to start a certain number of these clubs during the ensuing year. With the engine also we have been making progress, and obviously if Light Aeroplane Clubs are to be used for training pilots a suitable engine for dual control is essential. I do not wish to be over sanguine, but I have reason for hoping that in the course of the summer we shall see a beginning made with an experiment that may prove very valuable in the matter of training pilots and of diffusing an air sense throughout the nation.

As to civil air transport, the year has been in some respects a difficult one. First there were the inevitable difficulties connected with the amalgamation of the small companies, then there was a difficulty between the company and the

pilots, and lastly there was the tragic accident at Croydon on Christmas Eve. With the accident at Croydon, and the subsequent inquiry, I intend to deal in the answer that I shall have to make to the resolution upon accidents, moved by my hon. friend the Member for Norwood, whilst the Under-Secretary of State will, at the close of the debate, give the House certain details connected with civil aviation, the Department for which he is particularly responsible. Lest, however, it should be thought that if I do not deal with civil aviation in my opening speech I am indifferent to its progress, or unsympathetic to its developments, let me state broadly in a sentence or two the lines of my general policy.

### Empire Air Routes

It has always been obvious to anyone who has some knowledge of civil flying that it is over long distances, and not with short journeys, that civil aviation has its real advantage over other means of transport. It is on this account that my chief aim in the field of civil transport is to develop a long-distance route between England and some distant Dominion within the Empire. Within a few days the Director of Civil Aviation, Sir Sefton Brancker, will return from a visit, a flying visit in the exact sense of the word, that he has recently paid to India for the express purpose of surveying possible air routes, and of selecting in consultation with certain representatives of the Air Staff airship bases. So far as any possible aeroplane route is concerned, one of our immediate difficulties is the international situation under which it is impossible to organise a regular air route over Germany, and I may say in passing that it is this same difficulty that is alone responsible for our failure to inaugurate a London to Prague service.

### Airships and the Need for Research

As to the airship route, the House will desire to know the present position of airship development. When I was last in office I made the announcement on behalf of the Government that we intended to resume the development of airships, and that we were in negotiation with a private company, associated with the name of the hon. and gallant Member for Uxbridge, for the purpose of instituting a commercial service to India. Then came the change of Government, and a new scheme was substituted for the earlier scheme in which two airships were to be built, one by the Air Ministry and one by the private company. Holding the view that airship development should at present be mainly commercial, and that the State should not itself engage upon a commercial enterprise, I felt bound to criticise Lord Thomson's scheme upon a number of details. When, however, I returned to the Air Ministry I found that the scheme had been in operation for several months, that commitments of several hundred thousand pounds had been undertaken, and, more important still, that the Air Staff were discovering the great potentialities of the airship for home and empire defence; for instance, as a troop carrier, and as an aeroplane carrier, and that, whatever might be the future of airships, it had become evident that a cautious period of very intensive research was absolutely essential in the interests of safety. Moreover, there had been so many changes in airship policy that to have thrown the question of airships immediately into the melting pot might have endangered their development altogether. This being so, it seemed best to me to transform rather than to destroy the Thomson scheme, and by transformation I mean that we should proceed with the building of the two airships, that we should make it as easy as possible to pool airship experience between the Air Ministry and the company, that we should set up an impartial committee of experts to advise the company and the Air Ministry alike on any technical problems referred to it, and that so soon as the building of the two ships has made some definite progress, we should take up without delay the question of developing the experimental stage into the commercial stage of an airship line between England and the Dominions, and by that I mean an airship line operated by private enterprise, and not by the State. In my opinion this was the wisest and safest course to pursue in the circumstances, and it has given us the opportunity to concentrate upon the very foundation of the problem, the problem of safety.

On no account must we take risks. It is our duty to make the fullest possible use of all the available scientific knowledge and research in every possible direction upon such questions as stresses and strains, fabrics and metals, and all the many other questions connected with the aerodynamics and the operation of airships.

## AIR ESTIMATES DEBATE

GENERALLY speaking, the debate on the Air Estimates proved even more futile than usual (and that is saying a good deal). There was the usual fatuous suggestion for reducing the R.A.F. to 1,000 all ranks, and, presumably, a similar attack to be made on the Navy and Army, thus robbing the Empire of every insurance by demolishing our defence forces altogether. Out of the superabundance of speakers, it seems only necessary to refer, and that very briefly, to a very few who had some sensible suggestions to make, or who brought out certain points worth serious consideration. In reply to one of his interrogators, Sir Samuel Hoare stated, with reference to the Fleet Air Arm Vote, "The position really is no different this year from what it has been in previous years. The Air Ministry is as responsible as ever for the training of the men and for the quality of the machines, and the only difference here is that the Grant-in-Aid stereotypes an arrangement that has always been in existence. The Admiralty asks for the quantity and gives a Grant-in-Aid for it, and we supply it in detail, we being entirely responsible for the detail."

Major-General Sir Frederick Sykes said we had spent, during the last six years £10,000,000 in the name of research, but was not satisfied with progress. We had done something in the matter of military machines, but Germany was doing more. We had new types of machines and engines slightly better than those of six years ago, but showing less relative improvement than those produced abroad. The flying boat was one of the most important forms of aircraft development, but had remained stagnant. Then there was the subject of research. It was upon research that the whole development depended, and it was not encouraging to find increased provision asked for armament and decreased provision made for research in aircraft and engines.

Mr. J. H. Hudson referred to what he described as "a very curious official view," and said that when the Manchurian War Lord recently came down to Peking, the diplomatic body there, consisting of our representative as well as the representatives of other nations, sent a memorandum to the Manchurian general, in which they expressed this view. They said: "We view with the greatest concern the use of aerial arms against objectives other than military

forces in the field, fortified places and naval units; the dropping of bombs on undefended towns is not only an act of wanton destruction, but a crime against a peaceful population. That, Mr. Hudson said, was the official view of the diplomatic body in China, and he wished the hon. Members could have as much in their minds their own houses and offices as evidently had the Diplomatic Legation at Peking.

Brigadier-General Warner, whose was a maiden speech, was consequently worth listening to, as he was miles away from all the old parliamentary hacks, stalking horses and dodges. He referred, among other things, to the obsolescence of pilots, and thought that for our reserve of pilots we had a great field for expansion in our universities and public schools, and suggested that the heads of universities and public schools might be approached. What he hoped was that aviation would become as much of a sport and game as cricket and football. He thought the heads of universities and public schools would be only too willing to meet in conference and to discuss how light aeroplane clubs could be formed in connection with universities and public schools. Brigadier-General Warner also made the very sensible suggestion that we should interchange officers with the great self-governing Dominions, and that a certain number of cadetships at Cranwell be given to gentlemen who were anxious to join the R.A.F. from overseas.

### Parachutes

In one of his replies Sir Samuel Hoare referred to the question of equipping service machines with parachutes. He thought the time had come when this ought to be done, and stated that he had decided to adopt the American Irvine parachute, a consignment of which was now on its way to this country. His regret was that it was American and not British, but he felt the question of safety appliances was of such urgency that he could not afford to wait any longer for the development of any type in this country. (In the Irvine parachute the pilot jumps overboard with the parachute strapped to his back, and when he judges he is sufficiently clear of his machine he pulls a cord, which releases a small parachute. The air pressure on this opens the large parachute.—Ed.)

## IN PARLIAMENT

### R.A.F. Ground Engineers' Licences

SIR F. SYKES on February 20 asked the Secretary of State for Air what proportion of Royal Air Force non-flying personnel have qualifications such as are required as a condition of issue of ground engineers' licences?

SIR S. HOARE: Strict comparison is not practicable owing to differences between civil and service organisation. Broadly, however, the duties of the civil ground engineer are performed in the service by fitters (aero) and carpenters (rigger) of sergeants' or higher rank. There are 569 airmen of these trades of sergeants' or higher rank, and it may be taken that they are qualified at least to the standard required for a ground engineer's licence.

### Reserve Officers

SIR F. SYKES asked the number of qualified pilots who were demobilised from the Royal Air Force after the War; the number who have joined the Royal Air Force Reserve; whether the latter are considered sufficient for reserve requirements; and, if not, what steps are being taken to increase the number?

SIR S. HOARE: As regards the first part of the question, no statistics giving the information required are readily available, and the lengthy research that would be involved in obtaining it would not, I think, be justified by the results. In answer to the second part of the question, the number of qualified pilots who have joined the Reserve direct from civil life and without passing to it through the Short Service Commission stage, is 488. As regards the third and fourth parts of the question, I am not satisfied that the present number of reserve officers is sufficient, and provision will be made in the forthcoming Estimates for widening the field of recruitment.

### French Air Service

MR. LANSBURY on February 23 asked the Secretary of State for Air the strength of the French Air Service in men and machines for the years 1920, 1921, 1922, 1923, and 1924, and the amount of money voted for this service by the French Parliament?

SIR S. HOARE: The number of French squadrons existing at the end of each of the years referred to was approximately as follows: 1920, 126 squadrons; 1921, 129; 1922, 135; 1923, 139; 1924, 140. This latter figure, as I explained in reply to the hon. and gallant member for Hull Central on the 19th instant, excludes any squadrons now in process of formation, as to which, so far as I am aware, the French Government have not published any particulars. The average number of machines in a French squadron is 9. As regards the other information asked for by the hon. member, it is not possible to give either the number of men employed on air duties nor the amount of money voted for the Air Service, since a large number of the personnel employed on air duties are found in France by the Army or Navy, and a great part of the expenditure on the Air Service is included in the Military and Naval Votes, from which it is impossible to extricate it.

### Iraq and India Air Operations

MR. LANSBURY asked on how many occasions has the Air Force been called upon to undertake bombing expeditions in Asia or Africa, and the number of British and foreign killed and wounded which took place as a result of such expeditions; and can he give the approximate total cost of those operations?

SIR S. HOARE: I do not know what length of time the hon. member has in mind, but taking the period from January 1, 1924, there have been nine operations in which bombing took place. Seven of these operations were in Iraq and Trans-Jordan and two in India. The most important of them were for the purpose of repelling incursions by raiding tribesmen into Iraq and Trans-Jordan. The total British casualties arising out of bombing operations, in all areas during the period in question were four killed and three wounded. It is not possible, in view of the nature of the operations and the wide area over which they took place to ascertain correctly the number of casualties inflicted. Nor is it possible to detach the cost of these operations from the general cost of maintenance of squadrons in the various theatres concerned.

### Officers' Flying Qualifications

SIR J. NALL on February 24 asked the Secretary of State for War whether any record of officers qualified for service with the Flying Corps was available on the outbreak of war in 1914; and how many officers were recorded as being available?

SIR L. WORTHINGTON-EVANS: The number so recorded for the military wing of the Royal Flying Corps was 212.

### Air Service and Officers Qualified

LIEUT.-COL. SIR JOSEPH NALL on February 25 asked the First Lord of the Admiralty how many naval officers were qualified for service with the Royal Naval Air Service on the outbreak of war in 1914; and how many are qualified for Air Service at present?

MR. BRIDGEMAN: The number of officers qualified for service with the Royal Naval Air Service on the outbreak of war in 1914 was 83, of which 62 were naval officers on the active list and the remainder R.N.R. and direct entry officers.

At the present date the position is as follows:—Pilots: officers who have undergone the six months' course at No. 1 Flying School and are now undergoing further training at coastal stations, 49; undergoing course at No. 1 Flying School, 30; already qualified, 5; total 84. Observers: qualified officers, 36; under training, 10; total 46. Two commanders have also taken short courses of flying training.

### Naval Aircraft Carriers

SIR A. BURGESS asked the First Lord of the Admiralty how many aircraft carriers are built or building of over 10,000 tons displacement for the United States of America, Japan, and the British Empire?

MR. BRIDGEMAN: The following aircraft carriers of over 10,000 tons displacement are built or building for the United States of America, Japan, and the British Empire:—

U.S.A.—*Langley*, 12,700 tons displacement; *Saratoga*, 33,000; *Lexington*, 33,000; total, 78,700.

Japan.—*Akagi*, 27,000; *Kaga*, 27,000; total, 54,000.

British Empire.—*Hermes*, 11,000; *Argus*, 14,500; *Furious*, 19,100; *Eagle*, 22,700; *Glorious*, 22,500; *Courageous*, 22,500; total, 112,300.

In addition Japan has an aircraft carrier, the *Hosho*, of 9,500 tons. The total tonnage allowed by the Washington Treaty is: Great Britain, 135,000; United States of America, 135,000; Japan, 81,000.

\* Being reconstructed as aircraft carriers.



### Army, Navy, and Air Force Expenditure

CAPTAIN BENN asked the Chancellor of the Exchequer the gross expenditure on the Army, the Navy, and the Air Force, respectively, for each of the last five years?

Mr. Guinness: Following are the figures:—

|         |             | Navy.       | Army.       | Air Force. |
|---------|-------------|-------------|-------------|------------|
|         |             | £           | £           | £          |
| 1920-21 | .. ..       | 112,793,809 | 210,258,444 | 23,949,370 |
| 1921-22 | .. ..       | 87,005,692  | 125,188,998 | 16,394,681 |
| 1922-23 | .. ..       | 65,403,954  | 66,001,075  | 14,585,271 |
| 1923-24 | .. ..       | 59,201,586  | 55,532,359  | 16,635,706 |
| 1924-25 | .. ..       | 59,693,251  | 54,480,000  | 19,392,000 |
|         | (estimated) |             |             |            |

### R.A.F. Promotion

BRIG.-GEN. WARNER asked the Secretary of State for Air the number of promotions from the ranks to permanent commissions that have been made in the Royal Air Force during the last 12 months; and the number of officers holding short service commissions in the Royal Air Force who have been granted permanent commissions in that force during the last 12 months?

Sir S. Hoare: As regards the first part of the question, seven airmen have been granted cadetships at the Royal Air Force Cadet College, Cranwell, within the last 12 months, with a view to the subsequent award of permanent commissions. As regards the second part, 82 officers holding short service commissions were granted permanent commissions in the same period.

### Halton Training School

MR. H. WILLIAMS asked the number of boys at the school of technical training, Halton, and also the total staff of all ranks, including civilians?

Sir S. Hoare: The number of boys at Halton according to the latest return is 2,101. As regards the staff, it is difficult to distinguish between the personnel who may be regarded as the school staff and those who are not so allocated, but if the staff on the strength of the boys' section only is taken, the total, including civilians, is 490.

### Boys' Wing, Cranwell

MR. H. WILLIAMS asked the number of boys at the Royal Air Force Cadet College, Cranwell, and also the total staff of all ranks, including civilians?

Sir S. Hoare: The number of boys as at January 31 last was 1,015, and the staff at the same date numbered 463, including civilians. These are the figures for the boys' wing at Cranwell, to which I take my hon. friend to refer, and they do not include the cadets nor the headquarter staff of the station, which administers both the cadet college and the boys' wing; they do, however, include a considerable number of airmen borne on the strength of the boys' wing but engaged on duties other than instructional duties.



### R.A.F. Accidents

ON February 25, an R.A.F. machine flying from Norfolk to Northolt, ran into a thick mist and crashed near Cheshunt, the pilot, F/O. Fleming, F. O. Vaughan, and L./A. Slade were injured, the latter seriously. Three other occupants escaped with cuts and bruises. On February 26, a Vickers' "Virginia," from Manston was forced by engine trouble, to descend at Barling, near Southend, and when near the

### Research Expenditure

CAPT. W. BENN, on February 20, asked what is the total expenditure on research for each of the last five years?

Sir S. Hoare: Eliminating expenditure on airships and war liabilities, the total expenditure on experimental and research services in each of the last five years has been: 1920-21, £1,077,000; 1921-22, £1,224,000; 1922-23, £991,000; 1923-24, £1,010,000; 1924-25, £1,280,000. The first four figures are those of actual expenditure; the last is from the current Estimates. As regards the services included in these figures, the hon. and gallant member will see in Appendix II of the Air Estimates for the forthcoming and the two last financial years a detailed statement of the items included for Estimate purposes in the total sums taken for experiment and research.

### Malta Air Reserve

SIR G. STRICKLAND asked the Secretary of State for Air whether he is aware that the Air Force raised in Malta for service in Egypt and Mesopotamia proved economical and satisfactory; and whether he has under consideration a scheme submitted to him for raising some auxiliary militia units in Malta with a view to saving transport should an acclimatised number of aircraft helpers be suddenly required in hot climates?

Sir S. Hoare: Proposals of the nature referred to by my hon. friend have been received and will be borne in mind. At the present moment I do consider that the creation of a Maltese reserve would be justified.

### Night Flying

CAPT. W. BENN asked the Secretary of State for Air whether he can make a statement showing what progress has been made in the development of night flying?

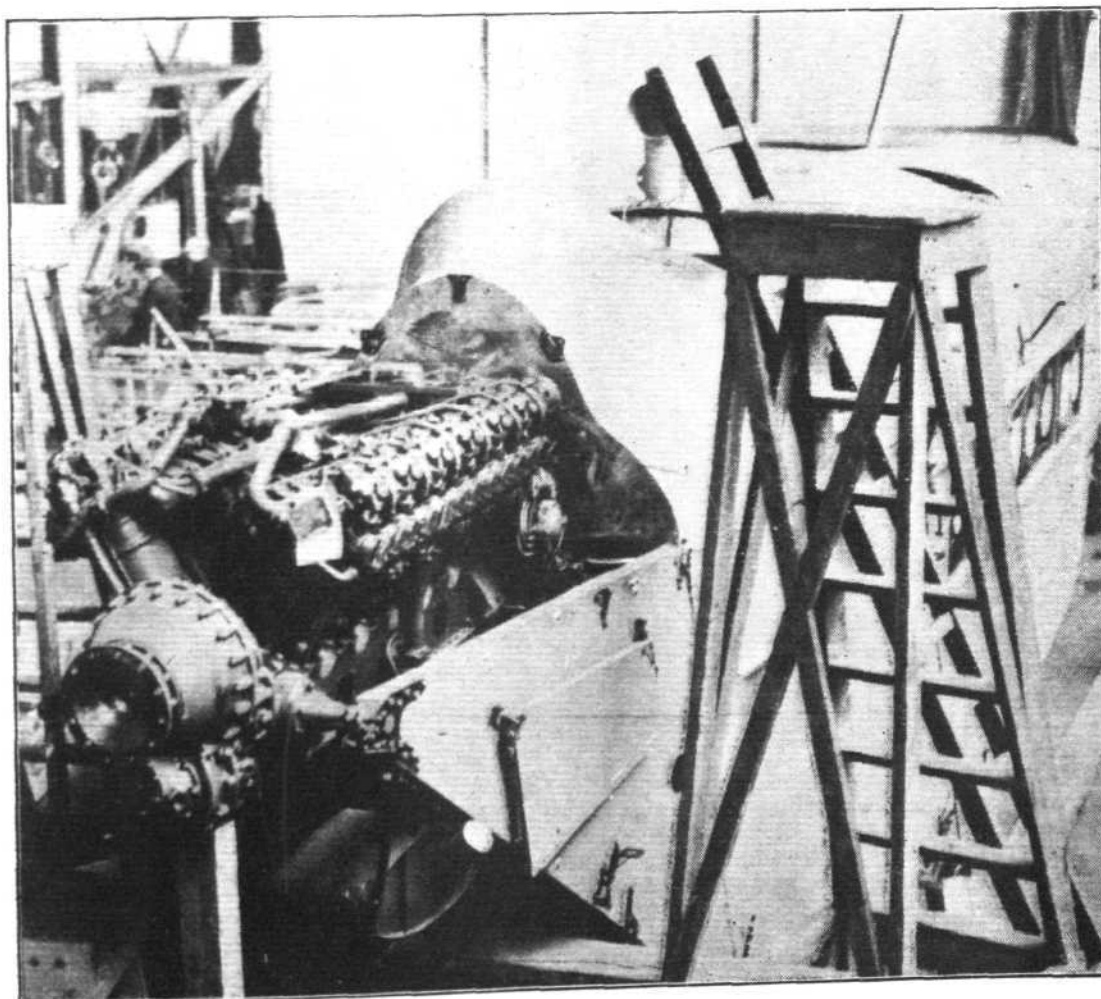
Sir S. Hoare: Night flying is regularly carried out as an integral part of the training of the Home Defence Force, and satisfactory progress is being made. Experiments have also been carried out to obtain data in regard to aerodrome and route lighting, the effectiveness of various lighting installations in fog at night, the lighting of the aircraft itself, navigation in general by night and certain other purposes. Further experiments are shortly to be undertaken upon the Paris-London air route with a civil aircraft equipped with various special devices for night flying. Valuable data upon the whole subject have already been obtained, and the work is continuing.

### Croydon Aerodrome

SIR H. BRITAIN asked the Secretary of State for Air what is the number of regular outgoing and incoming 'planes making use of the Croydon aerodrome per week during the winter and summer seasons, respectively?

Sir S. Hoare: On the assumption that the flights on regular commercial air services to and from the London Airport, Croydon, are in question, the number of aeroplanes outgoing and incoming averaged 161 per week, June to August last, and 47 per week, November to January last.

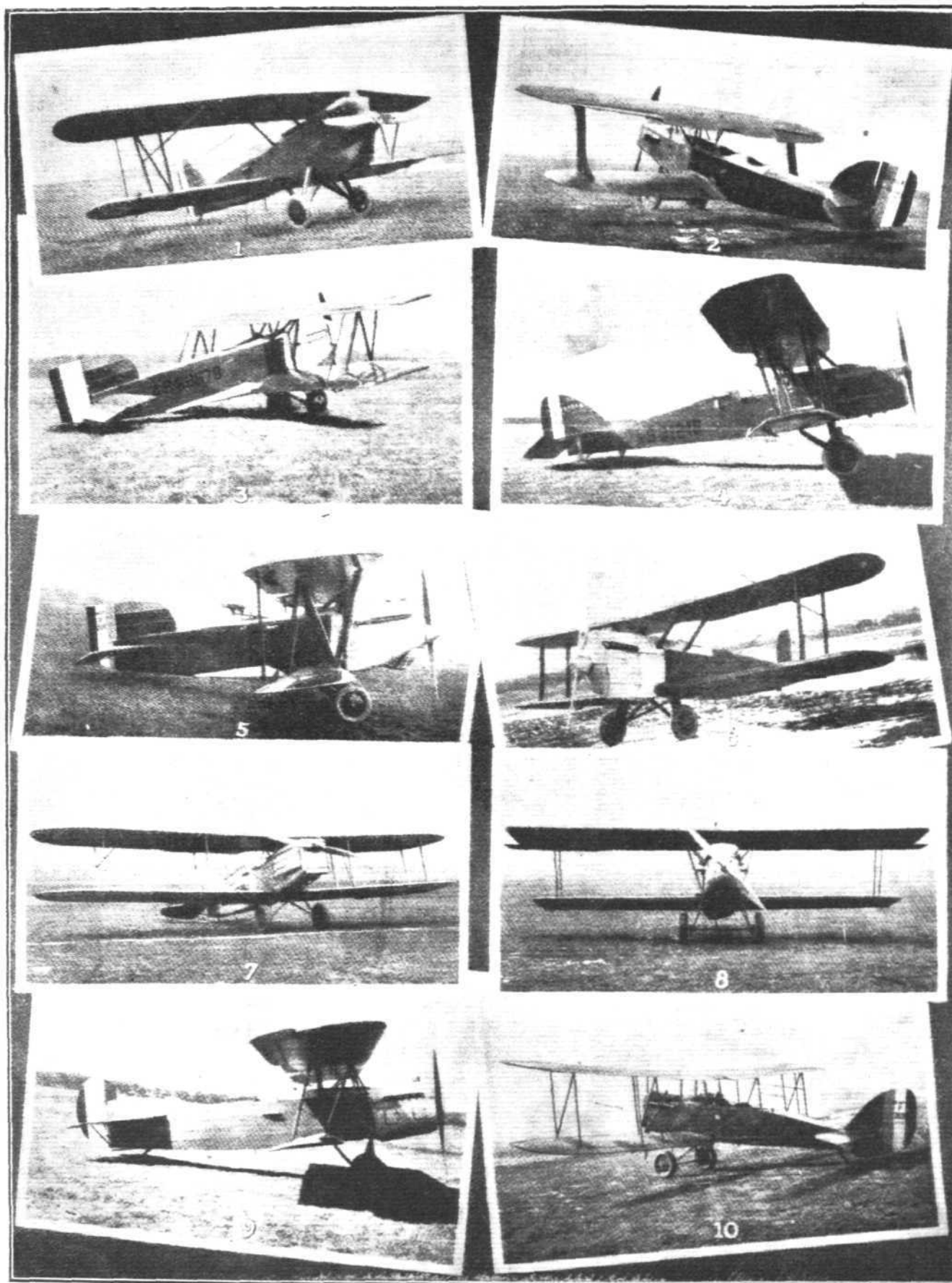
ground, Aircraftsman Marner jumped from the machine and was injured, but the pilot, F/O. Davis and four other occupants, escaped with a shaking. On February 27, as a result of an accident at Bircham Newton Aerodrome, to an Avro 504K of No. 99 (Bombing) Squadron Bircham Newton, Pilot Officer Cecil Stanley Marshall Woode, the pilot of the aircraft, was killed and No. 253189 A.C.1 Ernest Forrester, was seriously injured.



The new De Havilland Air Liner: The Rolls-Royce "Condor" has now been installed in the new D.H.54, as shown in our photograph, taken recently in the Stag Lane works.



## SOME U.S. OBSERVATION 'PLANES



**SOME U.S. OBSERVATION 'PLANES :** The interesting group of aeroplanes shown above, which we reproduce through the courtesy of our American contemporary "Slipstream," represents one of the most important items in the programme of military aeroplane development in the United States since the World War. Details concerning these new types of the observation category (formerly designated as "Corps Observation") are not yet available, and we are unable to give definite specifications of the various designs. These machines have been constructed to comply with present U.S. Air Service requirements as to load, speed, climb, ceiling, etc., and it is expected that the design chosen as best of the lot will afford a valuable asset to the U.S. Air Service in replacing the present obsolescent D.H. type of the War period. (1) Curtiss XO-1 (Liberty). (2) Cox-Klemin CO-1. (3) Engineering Division (Cox-Heinkel) TP-1. (4) Boeing X-CO-7B. (5) Engineering Division (Boulton-Kerber) XCO-5. (6) Douglas XO-2 (Liberty). (7) Engineering Division (Roche) XCO-6 (inverted Liberty). (8) Fokker CO-4. (9) Atlantic Fokker AO-1. (10) Atlantic-Loening XCO-8.

## AERONAUTICAL RESEARCH COMMITTEE REPORTS

FROM the number of enquiries we receive it appears that there is a desire in aircraft circles to know approximately the contents of the various technical publications of the Aeronautical Research Committee. All the aircraft firms probably receive these reports regularly, whether or not they contain anything of immediate interest or utility. In the case of draughtsmen, however, and others interested in aeronautics who cannot afford to purchase all the reports, the problem of deciding whether any publication interests him is often a difficult one. As it is obviously desirable that the knowledge of aeronautics should be made available to all who take an interest in the subject, we have arranged with the Air Ministry to publish in *FLIGHT* summaries of all the technical publications as soon as these are issued, or shortly before they are published. All A.R.C. publications can be purchased from H.M. Stationery Offices at Adastral House, Kingsway, London, W.C.2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 120, George Street, Edinburgh, and through any bookseller.

**Reports and Memoranda, No. 929 (Ae. 151).** Some Experiments on a Slotted Aerofoil. By H. B. Irving, B.Sc., and A. S. Batson, B.Sc. Price 1s. net.

Messrs. Handley Page initiated some years ago a wind tunnel research on the properties of slotted wings, having as its object the increase of the maximum lift coefficient, or, in other words, to obtain the maximum lifting capacity of an aeroplane for a given area of wings. Summaries of these results have been published in Reports and Memoranda, Nos. 834 and 930. The present paper is a continuation of this work at the National Physical Laboratory on an aerofoil measuring 6 in. by 36 in., of R.A.F. 15 section, with a single slot. A systematic exploration of the effect of varying the position of the leading aerofoil (corresponding with the portion of the wing in front of the slot) in relation to the main aerofoil has been made over a range of wind speeds between 20 and 90 ft./sec. In addition, some autorotation experiments were made for comparison with similar experiments on the standard R.A.F. 15 aerofoil.

As a result of variation in the position of the leading aerofoil the maximum lift coefficient was increased from the figure for maximum lift coefficient of 0.85 obtained by Messrs. Handley Page for the same sections of main and leading aerofoils to nearly 0.9. The speed effect on the arrangement tested was found to be considerable at the lower speeds, but between 65 and 90 ft./sec. it was very slight below the stall and not great above the stall.

The maximum autorotative couples on the slotted aerofoil were nearly four times those on the R.A.F. 15 aerofoil; the range and speed of autorotation were also much greater, although autorotation did not begin until a large angle of incidence was reached.

There is a possibility that difficulty in control may arise at low speeds with the full-scale aeroplane, and such is indicated by the model experiments and needs investigation. The model research will be continued at the N.P.L. on the sections R.A.F. 26 and 31.

**Reports and Memoranda, No. 937 (Ae. 158).** Measurements of Lift, Drag, and Pitching Moment on the 1/5th scale Model of the Bristol Fighter with Airscrew running. By E. F. Relf, A.R.C.Sc., and L. J. Jones. July, 1924. Price 1s. net.

The usefulness of model work depends upon adequate comparison tests between the model and the full-scale aeroplane. From the nature of the full-scale tests, it is clearly impossible to test a large number of aeroplanes, and accordingly some particular aeroplane is chosen every few years for careful comparative work on the two lines. A summary of comparisons so made is given in the Report of the Design Panel (R. & M. 900) on the scale effect on lift, drag and C.P. of complete aeroplanes and an earlier report of the scale effect Sub-Committee, R. & M. 374. Further work is being conducted on the Bristol Fighter aeroplane, both full-scale and model.

The present report is a continuation of the work described in an earlier paper, Reports and Memoranda, No. 876, which presented the results of measurement of lift, drag and pitching moment on the Bristol Fighter at angles below the stall. In those experiments the airscrew was not present, except in one series of measurements, which was made with airscrew stationary for direct comparison with gliding tests at the Royal Aircraft Establishment.

The tests of the present report can be briefly summarised as follows:—

(1) Lift, drag and pitching moment with airscrew stationary, at angles above the stall.

(2) Similar measurements at all angles of incidence from 0° to 36° with airscrew running at various values of  $V_{ND}$ , with various tail and elevator settings, and without tail.

(3) Torque measurements on the airscrew under the conditions of (2).

(4) Thrust and torque of airscrew alone, with a "minimum body" to enclose the motor.

The results are mainly given as tables, but a few have been plotted in illustrative figures.

**Reports and Memoranda, No. 940 (Ae. 161).** An Analysis of the Pressure Distribution on a Model Airscrew by Means of the Vortex Theory. By A. Fage, A.R.C.Sc. November, 1924. Price 6d. net.

Several papers have been published in the Reports and Memoranda series on the application of the Prandtl vortex theory of aerofoils to the case of an airscrew. The original papers on this subject are R. & M. Nos. 786 and 869, and the general accuracy with which the theory therein described predicts thrust, torque and the distribution of thrust along the blade has been considered in a further paper, R. & M. 892. In this last, comparisons have been made between theoretical and experimental results for a number of airscrews belonging to the same family. The pressure results now analysed include determinations of thrust and torque for each blade element at the working conditions of maximum efficiency, climb and zero advance, and so permit a close examination of the theory against practical data for the particular case of an airscrew of medium pitch.

It is found that the vortex theory when applied to this airscrew over-estimates the thrust by amounts which vary from 12 per cent. at zero advance to 5 per cent. at maximum efficiency. The measured and calculated values of the torque agree within 3 per cent., except at zero advance, where the error amounts to 7 per cent. Comparisons with the results of the pressure experiments show that both the thrust and the torque at the tip are considerably over-estimated. It is shown that better agreement with experiment is obtained if the theoretical values of the translational inflow factor are increased at the tip sections. A comparison of pressure diagrams indicates, however, that the discrepancies at the tip cannot be completely accounted for by an under-estimation of the translational inflow factor.

**Reports and Memoranda, No. 928 (Ae. 150).** Test of Four Thick Aerofoils, R.A.F. 30, 31, 32, and 33. By F. B. Bradfield, Math. and Nat. Sci. Trip., and A. S. Hartshorn, B.Sc. September, 1924. Price 6d. net.

This report describes a routine wind tunnel test on four thick aerofoils, the theory of the design of which has been described elsewhere in Reports and Memoranda No. 946.

R.A.F. 30 is a symmetrical section, twice the thickness of R.A.F. 15. R.A.F. 31 and 32 are derived from R.A.F. 30 by curving the centre line to circular arcs of cambers 0.02 and 0.05. R.A.F. 33 is derived from R.A.F. 30 by using a reflexed centre line of the same camber as R.A.F. 32, and is designed to have a fixed centre of pressure.

Lift, drag, and centre of pressure were determined at  $VL = 40$  on aerofoils of 8-in. chord and 48-in. span, and lift and drag also at  $VL = 53.3$ .

The main characteristics at  $VL = 40$  are given below. The results for R.A.F. 15 measured in the same channel (6-in. chord at  $V = 80$  ft./sec.) are added for comparison.

| Aerofoil      | $k_L$ max. | $k_D$ min. | $k_{MO}$ | $L/D$ max. |
|---------------|------------|------------|----------|------------|
| R.A.F. 30 ... | 0.415      | 0.0054     | -0.003*  | 18.2       |
| 31 ...        | 0.525      | 0.0065     | -0.029   | 19.1       |
| 32 ...        | 0.656      | 0.0083     | -0.067   | 18.1       |
| 33 ...        | 0.620      | 0.0087     | -0.009   | 17.5       |
| R.A.F. 15 ... | 0.531      | 0.0063     | -0.014   | 20.5       |

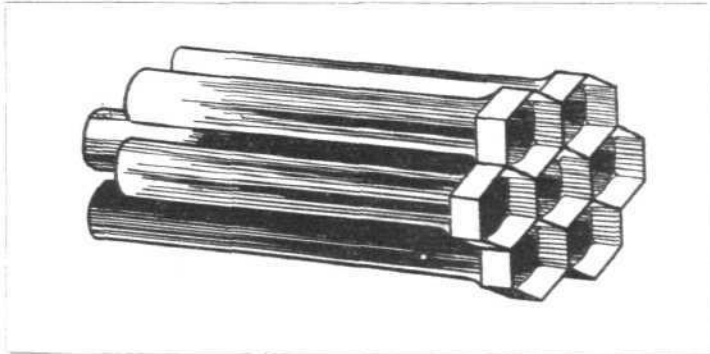
It is understood that full-scale experiments will be made with the sections R.A.F. 31 and 32.

\* Measured value, due to asymmetry of model.



## SERCK RADIATORS

STRENGTH combined with lightness is a desideratum figuring in almost every part of an aeroplane, and its achievement calls for much thought and the overcoming of many difficulties. The radiator for the water-cooled engine of an aircraft presents a problem in this respect that is not altogether easy to solve, for owing to the nature of its functioning a radiator must of necessity be a device of somewhat "delicate" construction—which, while certainly making for lightness, does not help as regards strength.



**SERCK AERO-RADIATORS :** The above sketch illustrates the construction of the Serck radiator, in which a number of tubes with their ends expanded into the form of a hexagon, are stacked together horizontally, as shown, so that while the ends are joined solidly together a water space is formed between the ends and round the tubes. The block of tubes is, of course, mounted in a suitable frame, and the air-current passes right through the tubes.

Serck Radiators, Ltd., of Birmingham, have met with considerable success in the solution of the problem of producing a strong, light, and at the same time efficient radiator suitable for use on aircraft. This success is the result of many years of experience in the construction of radiators, both for motor-cars and for aircraft, for this firm was originally the Motor Radiator Mfg. Co., which concern was taken over by the Ministry of Munitions during the War as the National Aircraft Radiator Co., when a large number

of radiators of various types were produced. Even at that time the works were very large, but we are given to understand that today the company has extended still further by opening service factories in London, Manchester, Newcastle-on-Tyne, Cardiff, Sudbury and Chester, and the company is now very busily engaged on aircraft radiators, both for the British Government and British firms, and also for foreign contracts, including one for Russia. It may be of interest to add that, as the Motor Radiator Mfg. Co., they were the pioneers of the aircraft radiator—having built these as far back as 1912—while they also carried out many experiments for such pioneers as Col. Cody and Grahame White, as well as for the Royal Aircraft Factory when it was first established at Farnborough.

As regards the radiator itself, this is remarkably simple and ingenious in its construction. Each unit—which may be built up to almost any shape—consists of a series of thin drawn brass tubes, the ends of which are expanded into the form of a hexagon, which are stacked together horizontally. Owing to the larger diameter of the ends, which fit closely to one another, the walls of the main portion of the tube are separated from each other by a space. Now, a block of tubes so stacked has its ends dipped into a solder bath, and thus joined together, forming water-tight walls at each end of the complete block. The latter is then mounted in a suitable frame, closing up the sides, top, and bottom. Thus it will be seen that we have a "box" having a number of tubes passing through it from front to back, each tube being separated by a small space, which is filled with water. The current of air passing through the tubes is thus able to cool a comparatively large surface of water surrounding the latter.

The accompanying sketch will, we think, make this arrangement clear.

Originally, the tubes had their ends expanded round, but it will be seen that in this case, when the tubes were stacked together, a small space was left where the circular ends did not touch. When the block was dipped in the solder bath this space was filled up with solder, and it naturally caused a certain amount of head resistance, whereas with the hexagonal type there is only the "honey-comb" of the double thickness of the tubes to be taken into account. We believe, also, that radiators were constructed on this system in which the water passed *through* the tubes—which were stacked vertically—and the air *round* them.

## AIR RAID COMPENSATION

MR. J. M. JUDD, Secretary of the City of London and London Air Raid Bombardment Sufferers' Association, has issued to the Press copies of correspondence which has passed between the association and Mr. Churchill, the Chancellor of the Exchequer, with regard to the treatment of air raid sufferers by the Government in respect to the question of compensation.

Replying to a letter dated December 4, in which Mr. Churchill intimated that he was unable at present to arrange a personal interview, but was willing to consider any representations in writing, the association forwarded to the right hon. gentleman a statement of their case.

In answer to this statement the following letter was received by the association from the Treasury, dated February 3:

"The Chancellor has considered the representations made in your statement of the 16th instant, but he regrets that he cannot regard them as well founded. He can only repeat the declaration made by the then Chancellor of the Exchequer, in May, 1920, that under the Treaty of Versailles individuals who have suffered damage have no reparation claim against Germany, and refer you to the announcements made and repeated by successive Governments that the awards made by the Royal Commission on Enemy Damage out of the grant of £5,000,000 must be regarded as final. This sum already represents a share of reparation receipts far in excess of the proportion of private to public claims to reparation, and it is impossible to contemplate increasing it at the expense of the British taxpayer. He would only add that every form sent out by Government Departments for the purpose of registering claims expressly stated that His Majesty's Government could not guarantee that compensation would be received."

To this letter Mr. Judd replied on February 11 as follows: "We have your letter of the 3rd instant, and regret that your letter appears to be dictated rather by departmental

considerations than by the broad statesmanlike consideration which we had hoped you would have given to this matter. We venture to suggest to you that before committing yourself to a final decision it would be well to give weight to the following points:—

"1. It is unquestioned that individual claims for damage from air raids, etc., which had been notified to H.M. Government were included in the claim of the British Government submitted to the Reparation Commission, and that Germany was required and undertook by Article 232 of the Treaty of Versailles to pay such claims in full. 2. It is a matter of fact that the Government compelled, by the Royal Proclamation of September 7, 1916, all who had claims against enemy governments to send these claims in to the Foreign Office. 3. It is a fact that the French and Belgian Governments have accepted liability to their nationals, irrespective of whether reparations are received to cover the full amount of the damage for which they have accepted responsibility. 4. By a convention signed in Paris on November 23, 1923, between the United Kingdom, France, Italy and Japan, it was agreed to devote various sums, and the British Government specifically devoted a further sum to the payment of damages suffered by the nationals of the contracting Powers from Turkish action during the War.

"We therefore submit the following considerations to you:—

"1. That when we make public the present position of claimants from Reparations for repayment of damages they have suffered from risks run in common by the whole community, it will be the general desire of our fellow-taxpayers that the Government shall not appropriate to their benefit the damages received on account of losses suffered by individuals from risks run in common. 2. That it is not a wise nor statesmanlike action (apart from any consideration of justice) to allow a feeling of injustice and ill-treatment to



continue to exist in the minds of 50,000 claimants spread along the coast of England from Land's End to Inverness, and inland, from Newcastle to Lancashire, and in London. 3. Is it wise, or for the furtherance of British trade, that in the North of France and Belgium 'The Englishman's plot' should be used as a term of derision to describe the site of a destroyed factory which has not been rebuilt owing to the fact that, although the claims of English firms with all others were assessed by the Governments of France and Belgium, and although the French and Belgian nationals have received their compensation, it is common knowledge that the Englishman cannot get a square deal out of his Government? 4. Is it calculated to increase the esteem in which the British nation has hitherto stood, both in France and in the U.S.A., that they should know that (unlike all other Allied Governments) the British Government is appropriating to its own use moneys obtained from Germany for damages done to the British civilian population? Whilst at the same time they know that when associated with other Governments, under the Convention signed on November 23, 1923, the British Government has been compelled by the sense of fairness in other nations to provide money to pay for damages

done to the British civilian population by Turkey! We have not come to you for a legal decision, but for a just consideration of our claims, and once more we appeal to you to give us an opportunity of stating our case, and of refuting the inaccuracies, both expressed and implied, which appear in your last letter to us."

The Treasury, on February 17, intimated that Mr. Churchill regretted that he could add nothing to his letter of February 3, "which was written after the most careful consideration of the whole question."

Mr. Judd has apparently missed one point calling for sympathetic consideration of the claims of the air victims—viz., the big profit balance which accrued to the Treasury on balance resulting from FLIGHT's Air Raid Insurance Scheme, which was ultimately taken up by the Government with the result of the credit balance of some eleven millions.

Possibly, Mr. Judd might enlist the goodwill of any of those who obtained "honours" for their adoption (without acknowledgment) of FLIGHT's scheme, to soften the hearts of those who have the power to sympathetically consider the claims put forward.

## THE "SUBITO" CYLINDER GAUGE

WE give below some particulars of a useful and extremely ingenious precision tool for the purpose of checking the measurements of engine cylinders and similar cylindrical objects. This device, which is known as the "Subito" cylinder gauge, is supplied by Aug. E. Menuge, Motor Accessories, of Worplesdon, Surrey, and although it has only quite recently been placed on the market many important automobile firms are making use of it on a large scale.

The "Subito" will be found to be of great service in increasing quantity and quality of the work produced, not only of automobile and aero engine manufacturers, but of electrical and machine tool engineers, ball bearing manufacturers, and generally in all workshops. Its sphere of usefulness is not confined to control work, but it can also be used in the shop in connection with turning or grinding operations. Out of round, taper, and all other such defects in any cylindrical object are instantly detected by this instrument.

So much for what it does—now let us see *how* it does it, with the help of the accompanying sketch. The instrument consists of a rod—the model we examined measured some 16 ins. long—at the top end of which is mounted a gauge showing + and - (or maximum and minimum) readings. At the base of the instrument is a T-shaped fitting, with contact ridges formed on the outer ends of the arms, while the foot of the T is formed to receive a plunger, or "feeler." Each instrument, it should be added, is provided with a set of these feelers varying in length in order to cover a range of diameters.

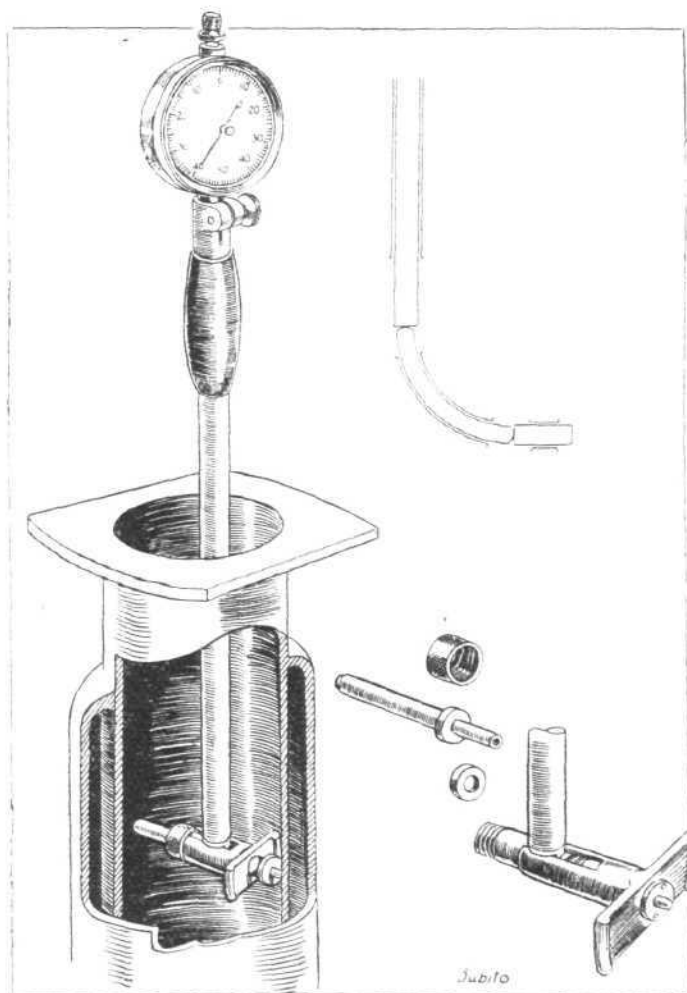
If the T end of the rod is inserted within a cylinder, a suitable feeler having been fitted, it will be seen that the T will make contact with the walls of the cylinder at three points—the two ridges on the arms, and the end of the feeler. Now, the feeler is in direct contact with a curved connecting link, which in turn makes contact with the rod passing up within the main body of the instrument to the dial mechanism. It should be explained here that if the feeler is pushed into the T it will transmit its movement to the curved link, which can slide within its guide, and so to the pointer of the dial *via* the rod. This movement takes place against the pressure of springs, and there is, therefore, no play and the transmission is absolutely rigid.

It will be seen that on rocking the instrument from side to side within the cylinder the readings on the dial will vary according to the angle made by the instrument, but there is, of course, one position when all three points of contact lie dead on the true circumference of the cylinder—that will give a minimum reading on the dial. This corresponds to the true diameter of the cylinder. Provision is made for adjusting the pointer to zero on the scale, so that if this be done at the minimum reading further tests over other parts of the cylinder walls will indicate plus or minus readings corresponding to any over or under size in the diameter of the cylinder. All kinds of calipers, gauges and micrometers can be used in connection with the "Subito."

The principal advantages of the "Subito" cylinder gauge may be summarised as follows:—No play, constant accuracy

—lever and cone transmissions being eliminated; only two contact points, and no slides which are detrimental to accurate measuring results; great range of measurements; easy and quick handling and reading—any inexperienced person can use it; automatic recording of diameter at any point of the cylinder.

The "Subito" gauge is manufactured in six sizes, covering a range of diameters of from 20 mm. (0.787 in.) to 400 mm. (15.748 ins.), each set being packed in a neat wooden case, complete with range of "feelers," etc



THE "SUBITO" PATENT CYLINDER GAUGE: A simple but effective instrument for checking or measuring the diameter of engine cylinders and similar cylindrical objects

# INTER-SERVICES RUGBY FOOTBALL

## Royal Air Force v. Royal Navy

PLAYED at Twickenham on Wednesday, February 25, and won by the Royal Air Force by one penalty goal (three points) to nil.

"The Air Force ought to be good at this game," remarked a spectator at Twickenham last Wednesday, "as the Rugby ball is streamlined." To which came the obvious retort, "But today the Navy are playing in their own element, water." Twickenham can always be counted upon to raise some sunshine when England plays there. But for the contests of Britain's airmen and seamen that ground, addicted as it is to customs and "records," does not seem to feel that any special effort to propitiate the elements is called for. Do not both the Air Force and the Navy boast that they despise all such matters? So on Wednesday last it rained heartily most of the day, and the game started in a lake and ended in a quagmire. Seldom has such a thoroughly miry game of Rugby football been seen. The teams came out of the pavilion spic and span in their jerseys of horizon blue and navy blue—an uninitiated spectator might have been excused for thinking it was a Varsity match—with nice white numbers on their backs. Before the end they were all the same colour, with numbers indistinguishable, and it might have been a match between New Zealand and the All Blacks. The only patch of brightness left on the field was Aircraftsman Casey, the R.A.F. full back, whose light-blue jersey was in startling contrast to the otherwise universal mud colour. Once, when the scrum swung round and round before the ball was put in, as scrums will do now and then, it became impossible to tell in which direction each pack ought to be shoving, and to this moment your reporter remains in some doubt as to whether the Air Force did not shove towards their own goal in the end.

In such conditions anything in the nature of good outside play became impossible. International players dropped passes which looked simple as though they were tyros. The greasy ball was simply unholdable. On occasions a player would drop the ball when running himself and not even trying to pass. This was particularly disappointing in view of the galaxy of international talent which was on the field. C. N. Lowe, of the Air Force (who played right centre), and C. A. Kershaw, of the Navy, recalled the days not long past, when England used to beat all other nations as a matter of course, and very largely through these two players. Harry Stephenson, of the Navy, is still the most sparkling three-quarter in the dashing Irish team which so nearly broke the Twickenham record on February 14 last, and G. R. Beamish is one of those Irish forwards who stormed so fiercely on the English lines. Petty Officer Luddington is one of the stoutest of the forwards who upheld the Rose on that desperate day. Beamish and Luddington, renewing their recent duel, may have enjoyed last Wednesday's game, but Lowe, Kershaw, and Stephenson had a very trying time.

The game had to be fought out by the forwards, and the two packs were very evenly matched both in the tight and in the loose. They shoved hard, they rushed with *élan*, and they tackled keenly. The tackling was good throughout on both sides, and in the attempts at three-quarter play was the only feature which permitted admiration. Here again honours were about even on both sides. In one respect the Air Force was markedly superior—namely, in the fielding and kicking of their full back. The wet ball did not trouble Casey at all; he caught high kicks with the utmost sangfroid, and his touch-finding kicks had an excellent length.

The two scrum halves, Kershaw and Russell, who were also the two captains, deserve a special word of praise for clever play in desperately difficult conditions. Both showed that it was possible to be neat and nippy with a ball which provoked nothing but clumsiness in other players. It was grand to see how Russell held his own against his famous opposite number. Here again the honours were pretty equally divided.

On the day's play a draw would have been the most fitting result, for the teams were very level. A result decided by a penalty goal is never very satisfactory to either side. The moral of a penalty goal is that it teaches the other side not to break rules, and apparently it had that effect on the Navy, for they only had the one free kick given against them. But the R.A.F., escaping again and again from some very near shots at their goal, refused to learn the lesson. No less than 10 free kicks were given against them. The contrast of these figures makes an Air Force win by means of a penalty goal as little satisfactory as any win can be. It must be called lucky, despite the excellence of Corpl. Wale's kick;

but if there is to be any luck flying about, we hope that it will always favour the Royal Air Force.

The game does not permit of a very detailed description. At the beginning Kershaw was prominent in twice getting away round the scrum, but the passes he gave were not held. Then the Air Force forwards had their turn of getting the ball and heeling, and on one occasion Corpl. Wale dribbled on well and tackled Satterthwaite, the Navy full back, when he picked up. Not long after, Harry Stephenson got well away down the right wing, and when Casey went for him low, he jumped and wriggled clear; but in doing so he stumbled, and this gave time for Air reinforcements to get back and ground him. Again the Navy got the ball out, and Lee, the fly half, sold the dummy, and the ball was taken up to near the R.A.F. line. Cumberbatch tried to drop a goal, but the ball ran along the ground. Casey several times drove the Navy back to half-way by his good kicking.

Presently a great rush by the Air Force forwards took the ball up to the Navy's full back. Satterthwaite fumbled, and the Air Force surged up to the line. They were slowly driven back to the 25, but there the referee awarded them a free kick, from which Wale placed a goal. It was a long kick and from none too easy an angle, and the ball was absolutely sodden. It may here be remarked that several of the Navy's attempts to kick a goal off a penalty were very nearly as creditable as Wale's successful effort.

Roused by this reverse, the Navy had the best of things for a time. Wood went hard down their left wing and got past Casey, but then passed forward. Relief came when the ball was kicked over the R.A.F. line and touched down. The airmen had their turn, and, chiefly by better kicking, they drove the Navy back into their 25, but the airmen in turn lost their chance by kicking over the line. Their captain's disapproval must have been audible at Richmond. Another fumble by Satterthwaite (fumbles were quite excusable that day to everyone, except Casey) brought the Air Force back, and the whistle blew for half-time with the R.A.F. attacking.

In the second half the ground and the ball got greasier and greasier, and the play mostly consisted of scrums in the middle of the largest and deepest slough in the field. Occasionally Russell or Kershaw would get the ball away, but the attempts at passing were merely ridiculous. Kicking paid better, and there the Air Force usually had the better of things. On many occasions their three-quarters kicked straight ahead and followed up hard. On normal days these are doubtful tactics, but in the circumstances it was sound policy. They trusted, and not in vain, to fumbling and short kicking by the Navy backs. But the free kicks to the Navy, which came about every eight minutes, constantly drove the airmen back.

The most thrilling incident of this period was when Russell whipped the ball out of a scrum in a patch of particularly viscous fluid, and got it away to Wale. The wing man ran hard, and was only tackled and hurled into touch at the corner flag, which was uprooted as the mass of humanity hurtled into it. Wale limped for some little time after. This was the nearest to a try which either side achieved. Marcy put in some useful kicks for the Air Force, but neither side again looked really dangerous, and the game ended without further scoring.

TEAMS:—*Royal Navy*: Paymaster Lt. E. S. Satterthwaite (H.M.S. Pembroke); Lt. H. W. V. Stephenson (H.M.S. Dolphin); Lt. H. C. Cumberbatch (H.M.S. Dolphin); Sub-Lt. R. W. Armytage (H.M.S. Excellent); and Sub-Lt. W. H. Wood (H.M.S. Excellent); Lt.-Cdr. C. A. Kershaw (Capt.) (R.N.C., Greenwich) and Sub-Lt. T. S. Lee (R.N.E. College, Devonport); Reg. P.O. W. G. E. Luddington (H.M.S. Vivid); Lt. G. C. F. Branson (R.N.C. Greenwich); Lt. J. W. Forrest (H.M.S. Excellent); Lt. W. G. Agnew (H.M.S. Excellent); Lt. A. A. Havers (H.M.S. Pembroke); Sub-Lt. G. W. Yale (R.N.C., Greenwich); Sub-Lt. C. M. Morrell (R.N.C., Greenwich); and Lt. P. B. R. W. Williams-Powlett (R.N. Training Establishment, Shotley).

*Royal Air Force*.—Aircraftsman W. Casey (Henlow); Cpl. J. M. Wale (Flowerdown); Pilot Officer J. Marcy (Andover), Flt. Lt. C. N. Lowe (Kenley), and Flt. Lt. O. C. Bryson (Cranwell); Sqdn. Ldr. J. C. Russell (Upavon) (Capt.) and Flying Officer P. J. Chambers (Manston); Flt. Lt. J. S. Chick (Farnborough), Flt. Lt. E. T. Turner (Uxbridge), F.O. F. W. Sinclair (Henlow), F.O. T. Rose (Duxford), Pilot Officer F. V. Beamish (Old Sarum), Pilot Officer G. R. Beamish (Spittlegate), F.O. C. D. Adams (Netheravon), and Cpl. W. Johnson (Ruislip).



# THE ROYAL AIR FORCE

*London Gazette, February 24, 1925*  
*General Duties Branch*

The following Flying Officers are granted permanent commns. in rank stated (Feb. 25):—E. E. Arnold, D.F.C., O. E. Worsley. Sec. Lieut. P. L. Binns, E. Yorks R., is granted a temp. commn. as a Flying Officer, on seconding for four years' duty with R.A.F.; Jan. 31. The following Pilot Officers on probation are confirmed in rank:—W. L. McLaren, J. H. Sender, C. W. M. Smith, W. Woollett; Dec. 30, 1924. E. L. Leader; Jan. 5. J. A. Ballantyne, L. S. Birt, P. S. Blockey, W. T. Collins, F. H. Farrow, R. F. Francis, A. E. Haes, W. T. Holmes, C. A. E. S. Kregor, G. D. Middleton, P. H. Nicholls, A. G. Pickering, A. T. S. Studdert, D. M. Tyningham; Jan. 15. A. C. H. Sharp; Jan. 16. C. E. Galpin; Jan. 29.

Sqdn. Ldr. R. L. G. Marix, D.S.O., is placed on half-pay, scale A; Feb. 25. The following Flying Offrs. are transferred to Reserve, Class A:—C. E. J. Arthur; Feb. 24. W. J. McDonough; Feb. 22. G. Thornton-Norris; Feb. 22. C. W. Usher; Feb. 22. Observer Offr. J. F. V. Sugars is placed on the retd. list on account of ill-health; Feb. 25. Pilot Offr. G. C. I. Strachan is dismissed the Service by sentence of Gen. Court-Martial; Feb. 16. *Gazette* Sept. 16, 1924, concerning Flight Lieut. D. F. Lucking, is cancelled.

## Stores Branch

Flying Offr. A. J. Adams is granted a permanent commn. in rank stated; Feb. 25.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the R.A.F. are notified:—

### General Duties Branch

**Squadron Leaders:** H. E. F. Wyncoll, O.B.E., M.C., to No. 24 Sqdn., Kenley; 20.2.25. G. G. A. Williams, to No. 1 School of Tech. Training (Boys), Halton; 17.2.25. A. P. Maurice, D.F.C., to Aircraft Park, India; 13.2.25. G. W. Robarts, M.C., to No. 111 Sqdn., Duxford; 26.2.25. C. W. Mackey, to No. 7 Group H.Q., Andover; 19.2.25.

**Flight Lieutenants:** A. C. Randall, D.F.C., to Station H.Q., Duxford; 18.2.25. M. A. Simpson, to Inland Area Aircraft Depot, Henlow; 18.2.25. J. Whitford, to No. 11 Sqdn., Netheravon, instead of to No. 12 Sqdn., as previously notified; 24.2.25. D. Colyer, D.F.C., to Aircraft Depot, Iraq; 1.2.25. E. Thornton, to Aircraft Park, India; 17.1.25. J. A. Hollis, to No. 5 Sqdn., India; 26.1.25. C. H. N. Nunn, to No. 1 Sch. of Tech. Training (Boys), Halton; 2.3.25. G. M. Bryer, O.B.E., A.F.C., to Air Ministry; 1.3.25. R. St. H. Clarke, A.F.C., to No. 10 Group H.Q., Lee-on-Solent; 2.3.25.

**Flying Officers:** K. H. Holley, to No. 1 Flying Training Sch., Netheravon; 23.2.25. W. A. C. A. Yearsley, to No. 25 Sqdn., Hawkinge; 9.2.25. W. C. Williams, to No. 2 Flying Training Sch., Digby; 23.2.25. H. S. C. Bassett, to No. 11 Sqdn., Netheravon; 20.2.25. A. T. Laing, to Heliopolis Details, Egypt; 30.1.25. T. H. Moon, to Inland Water Transport, Iraq; 30.1.25. F. E. C. Benstead, to H.Q., Iraq; 13.2.25. L. A. W. Deane, to Inland Area Aircraft Depot, Henlow; 9.1.25. B. H. C. Russell, to Sch. of Army Co-operation (No. 16 Sqdn.), Old Sarum; 23.2.25. L. E. Cutforth, to No. 5 Sqdn., India; 13.2.25. L. S. Hamilton, to Aircraft Depot, India; 13.2.25. C. J. A. Delany, to No. 27 Sqdn., India; 13.2.25. C. N. H. Bilney, to Marine Aircraft Experimental Estab., Felixstowe; 2.3.25. F. Miller, to Station H.Q., Bircham Newton; 23.2.25. H. N. Thornton, to Aircraft Depot, Egypt; 1.2.25. G. W. Dean, to No. 24 Sqdn., Kenley; 2.3.25.

**Pilot Officers.**—S. R. Sunnucks, to R.A.F. Base, Calshot; 16.2.25. P. Jones, to No. 444 Flight, Leuchars; 13.2.25. The undermentioned Pilot Officers are all posted, with effect from 16.2.25:—J. M. Cohn, to No. 11 Sqdn., Netheravon; F. H. S. David and A. W. G. Martin, to No. 99 Sqdn., Bircham Newton. C. Feather, H. S. Martin and G. B. M. Rhind, to No. 111 Sqdn., Duxford. E. A. H. Fisher and H. M. G. Parker, to No. 100 Sqdn., Spittlegate. R. A. Ford and A. N. Francombe, to No. 207 Sqdn., Eastchurch. V. G. H. Gee, W. V. R. Nicholl and N. A. West, to No. 12 Sqdn., Andover. M. W. Goldie, to No. 39 Sqdn., Spittlegate. H. R. Lowry, A. L. Macmillan and R. R. Bennett, to No. 17 Sqdn., Hawkinge. H. F. Luxmoore, A. W. B. McDonald, C. S. Staniland and H. W. P. Stewart, to No. 41 Sqdn., Northolt. A. D. McDowall and C. D. Shearing, to No. 9 Sqdn., Manston.

Pilot Officer H. D. Gunton, to No. 4 Flying Training Sch., Egypt; 13.2.25.

## Medical Branch

G. J. Griffiths is granted a short service commn. as Flying Offr., for three years on the active list, with effect from and with seny. of Feb. 11.

## Chaplains' Branch

The Rev. R. M. Banks-Jones, M.A., is granted a permanent commn. with the relative rank of Sqdn. Ldr.; Feb. 25.

## Reserve of Air Force Officers

A. H. A. C. Cranmer is granted a commn. in Class BB, Gen. Duties Branch, as a Pilot Offr. on probation; Feb. 24. The following Pilot Offrs. are promoted to rank of Flying Offr.:—J. H. C. Harrold; Dec. 10, 1924. G. H. Keat; Dec. 17, 1924. R. R. Rich; Jan. 31. R. K. Harvey; Feb. 10. C. H. L. Needham; Feb. 11. E. F. Smith; Feb. 14. G. C. F. Ely; Feb. 21.

The following are confirmed in rank:—Flying Offrs.—E. M. Bates; Feb. 12. H. A. A. Brosse; Feb. 12. A. C. Campbell-Orde, A.F.C.; Feb. 19. C. R. Vaughan; Feb. 12. Pilot Offrs.—A. J. C. Overall; Feb. 19. S. G. Shand; Feb. 12.

Flying Offr. W. Ridley is transferred from Class A to Class C; Feb. 24.

## Memorandum

The permission granted to Lieut. A. L. Seddon to retain rank is withdrawn on his conviction by the Civil Power; Nov. 17, 1924.

## Stores Branch

The following are granted permanent commns. in ranks stated (Feb. 18):—Flight-Lieut. J. S. Browne, A.F.C.; Flying Officer S. R. L. Poole. Flying Officer C. P. Wingfield is transferred to Stores Branch on probation (Feb. 9).

**Squadron Leader** J. H. Wiltford, to No. 7 Group H.Q., Andover; 9.2.25. **Flying Officer** H. J. Thomas, to remain at Inland Area Aircraft Depot Henlow, instead of to No. 4 Stores Depot as previously notified.

**Flying Officers.**—V. B. Ranford, to No. 216 Sqdn., Egypt; 16.1.25. H. A. Lotherington, to No. 28 Sqdn., India; 5.1.25. R. W. Stevenson, to No. 216 Sqdn., Egypt; 1.2.25. C. A. Loughurst, to H.Q., Egypt; 1.1.25.

## Accountant Branch

**Squadron Leader.**—C. P. Ogden, O.B.E., to H.Q., Iraq; 15.1.25. **Flying Officer** M. H. Luker, to Heliopolis Details, Egypt; 30.1.25. **Flying Officer.**—E. K. Greenhow, M.C., to No. 70 Sqdn., Iraq; 6.2.25.

## Reserve of Air Force Officers

C. E. Baldwin is granted a commn. in Class B.B. General Duties Branch, as a Pilot Officer on probation (Feb. 17). Flying Officer G. Kidd is transferred from Class A to Class C (Feb. 17). Flight-Lieut. B. C. W. Pasco is transferred from Class Dii. to Class Di (Feb. 11).

Erratum.—*Gazette* of Feb. 10. (FLIGHT, February 19, 1925, p. 103):—For Nicholls read Nicolls.

## Medical Branch

**Flight Lieutenants.**—H. J. Higgins (Dental), to Aircraft Depot, Egypt; 17.1.25. A. Briscoe, M.B., to R.A.F. Central Hospital, Finchley; 26.2.25.

**Flying Officers.**—T. Glynn, M.B., to Aircraft Park, India; 2.1.25. A. A. Townsend, M.B., to Aircraft Depot, India; 2.1.25. C. G. J. Nicholls, M.B., B. Pollard, to Research Lab. and Medical Officers' Sch. of Instruction, Hampstead, on appointment to Short Service Commns. for short course; 28.1.25. H. C. C. Patterson, to Marine Aircraft Experimental Estab., Felixstowe; 4.2.25. F. L. White, to R.A.F. Depot; 4.2.25. P. H. Musgrave, to R.A.F. Depot, on transfer to Home Estab.; 28.12.24.

**Flying Officers.**—G. J. Hanley, M.B., to R.A.F. Depot; 27.2.25. F. L. White, to No. 1 Flying Training Sch., Netheravon; 6.2.25.

**Flying Officers:** G. J. Griffiths, to Research Lab. and Med. Officers' Sch. of Instruction, Hampstead, on appointment to a Short Service Commn. for short course; 11.2.25. C. G. J. Nicolls, M.B., and B. Pollard, to R.A.F. Depot; 19.2.25.

## Chaplains' Branch

Rev. G. A. Davies, B.A., to Basrah Group H.Q., Iraq; 30.1.25.

## Forced Landings by Aircraft

AN Army Order has been issued as a guide to the procedure to be adopted when an aeroplane is compelled to make a forced landing in a field where troops are parading or carrying out manoeuvres. It is laid down that if an aeroplane approaches such a field and there is not time for the troops to double to the sides of the field, they should not be allowed to scatter in an endeavour to dodge the aeroplane, but should lie down immediately; for if the men are allowed to run about, it not only confuses the pilot and increases the chance of a crash, but renders the men liable to be hit by the aeroplane. Advice and instructions are also given as to subsequent procedure when an aeroplane has made a forced landing but escaped undamaged, and when it has crashed.

## "Wattel It Do?"

CAPT. FONCK and M. Wattel, the designer of the Wattel engine, have founded a company called the "Société Anonyme de Mécanique, Aéronautique, Automobile, Marine Industrie," with a capital of 500,000 fr., for exploiting this engine.

## Air Display for Wembley

To mark the opening of this year's British Empire Exhibition, at Wembley, a great spectacular display, entitled "London Defended," in the Stadium, has been arranged, in

which the Royal Air Force, the Royal Marines, and the Metropolitan Police will take part.

## Help from the Skies for Skiers

NEWS having been received that three skiers, who had set out from Zurich a week previously with only four days' provisions, were missing, and owing to the fact that a 6-ft. fall of snow in two days prevented search parties going to their rescue, three military airmen from Duebendorf flew over the Bernina with the object of locating the three skiers. The latter were observed coming down from Marinelli Hut, on the Italian side, and the airmen forthwith dropped bags of food for the skiers and then returned to St. Moritz with the news of their safety.

## Fatal Air Collisions

FLIGHT-LIEUTENANT JOSEPH WHITE, of Halifax, Nova Scotia, and Mr. R. H. Cross, of Toronto, an officer of the Royal Canadian Air Force in training at Camp Borden, were killed on February 24 as the result of a collision between their machine and another aeroplane. The latter effected a safe landing. Another mid-air collision occurred at Le Bourget on February 25, when a military aeroplane, emerging from a cloud, crashed into another machine, which fell in a damaged condition from a height of 3,000 ft. Both occupants were killed, but the other machine managed to land safely.



## THE ROYAL AIR FORCE MEMORIAL FUND

A MEETING of the Executive Committee was held at Iddesleigh House, Caxton Street, on February 18. Lord Hugh Cecil was in the chair, and there was a large attendance of members of the Committee.

The most important matter discussed was concerned with the future of the Vanbrugh Castle School, and the question of its enlargement was considered and a Sub-Committee was appointed to go carefully into the matter and to report to the next meeting of the Executive Committee. This Sub-Committee is to be presided over by Air Marshal Sir John Salmond, K.C.B., who has accepted re-election as a member of the Executive Committee. With regard to the School, it was announced that it was opened for the spring term on January 6, with a full attendance of 40 boys.

The Committee approved of a sum of £1,139 5s. 1d. which had been paid by way of grants to ex-officers and ex-airmen and their dependents between December 17, 1924, and the date of the meeting.

It was announced that the R.A.F. Memorial Fund Cottage, built at the expense of the Fund at the request of the Enham Village Centres' Council, Enham Village, Andover, is nearing completion, and it is hoped very shortly to find a suitable ex-R.A.F. pensioner who has been trained at the Centre to occupy the cottage.

The next meeting of the Executive Committee will take place on April 22, at the offices of the Fund, at 3 p.m.

The Committee have just issued two leaflets, which give particulars of the objects of the R.A.F. Memorial Fund, what it has done, and other interesting details. The secretary will be pleased to send copies of these leaflets to any of our readers who may be in sympathy with the movement, and who send a stamped addressed envelope to him at 7, Iddesleigh House, Caxton Street, S.W. 1.

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## Paris-Dakar Airmen Return Home

CAPTAINS LEMAITRE AND ARRACHARD, who made a plucky attempt to fly from Paris to Dakar without a stop recently, started on their return flight, *via* the Sahara, from Timbuctoo, on February 20. For some days no news was received as to their progress—telegraph and wireless facilities being somewhat scanty along the route taken—but on February 26 it was reported that they had arrived safely at El Goleah. It appears that they lost their bearings, and, running short of petrol, had to descend at Ain Mezzer Oasis, about 90 miles south-west of El Goleah.

## Brussels-Congo Flight

LIEUT. THIEFFRY, who is flying from Brussels to Belgian Congo, on a 3-engined Handley Page biplane, arrived at Niamey on February 25. He took the opportunity here of paying a visit to Col. Vuillemin and Capt. Dagnaux, who are in hospital at Niamey as a result of their accident to the Blériot, on which they were flying from Paris to Lake Chad, and who are now well on the road to recovery.

## Cape Town-Durban Air Mail

THE Cape Town to Durban air mail service was inaugurated on March 2, when two Defence Force aeroplanes, carrying 456½ lbs. of mails from the "Windsor Castle," left Wynberg aerodrome and arrived at Durban 2 hrs. 40 min. ahead of schedule time. The flight covered four stages, relays being made at Oudtshoorn, Port Elizabeth and East London.

## Royal Air Force Club

THE annual general meeting of the Royal Air Force Club will take place at 5 p.m. on Wednesday, March 11, 1925.

## Sir Sefton Brancker's Homeward Flight

SIR SEFTON BRANCKER left Karachi for Baghdad on February 25 in the D.H. 50 biplane (230 h.p. Siddeley "Puma") piloted by Alan Cobham. Flying in easy stages *via* the Persian Gulf, the 1,700 miles to Baghdad was accomplished in three days, the famous City of Caliphs being reached on February 28. Sir Sefton Brancker states that it has been definitely decided to make Karachi the first experimental airship base in India, the cost of which would be about £1,250,000.

## French Government Aviation Prizes

THE French Under-Secretary of State for Air, M. Laurent Eynac, has announced that about 600,000 fr. (£6,650) is offered in prizes to aeroplane and aero engine manufacturers whose machines succeed in establishing air records during 1925.

## PUBLICATIONS RECEIVED

- Militärwissenschaftliche und Technische Mitteilungen.* Vol. LVI. January-February, 1925. Stubenring 1, Vienna.
- The Accessory.* Vol. II, No. 113. February, 1925. Brown Brothers, Ltd., Great Eastern Street, London, E.C. 2.
- Illustrated Calendar,* 1925. E. Hamel and Co., Palmerston Street, Nottingham.
- Art In Industry.* By Sir Lawrence Weaver, K.B.E. The British Commercial Gas Association.
- Calendar and Blotter,* 1925. The Gas Light and Coke Co., Westminster, London, S.W.
- The Air Pilot Monthly Supplement,* No. 4. February, 1925. The Air Ministry, Kingsway, London, W.C. 2.
- Tenth Annual Report of the National Advisory Committee for Aeronautics,* 1924. U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.
- Lapping Machines.* Bethel Player and Co., Ltd., 17, Philpot Lane, London, E.C. 3.
- Aeronautical Research Committee, Reports and Memoranda:* No. 939 (Ae. 160).—On the Effect of Inertia on the Lateral Motion of an Aeroplane under the Influence of Gusts and Control Movements. By L. W. Bryant and D. H. Williams. October, 1924. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 6d. net.
- Calendar and Date Block for 1925.* R. T. Lang, Sells, Ltd., 168, Fleet Street, London, E.C. 4.
- Aeronautical Research Committee, Reports and Memoranda:* No. 918 (Ae. 144).—The Strength of Struts: A Review of Progress made in Theory and Experiment during the War. By R. V. Southwell. September, 1924. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 1s. 9d. net.
- Rendiconti Tecnici della Direzione Superiore del Genio e delle Costruzioni Aeronautiche.* Vol. XIII. No. 1. January, 1925. Commissariato di Aeronautica, Direzione Superiore del Genio e delle Costruzioni Aeronautiche, Viale Giulio Cesare, Rome. Price 40 L. it.

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## NEW COMPANY REGISTERED

AIRCRAFT MATERIALS, LTD.—Capital £3,000, in £1 shares. Manufacturers of and dealers in all materials for the construction, equipment, maintenance or running of aeroplanes, airships, hydroplanes, flying boats, and for aeronautical or other engines or motors, etc. First directors: C. W. Meredith (permanent), Aldwych House, Aldwych, W.C.; J. H. Meredith, Llanfair House, Kingston, Hereford. Solicitors: Cree and Turner, 109, Jeremy Street, St. James's, S.W. 1.

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## AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

### APPLIED FOR IN 1923

Published March 5, 1925

- 28,158. A. ROHRBACH. Wings for flying-machines. (206,843.)
- 28,256. E. K. A. BAUMANN. Supporting planes of aeroplanes. (228,637.)

### APPLIED FOR IN 1924

Published February 26, 1925

- 2,885. N. W. AKIMOFF. Hub appendages for propellers. (228,343.)
- 2,886. N. W. AKIMOFF. Propelling means for aircraft, etc. (228,344.)
- 8,327. C. C. WALKER. Hulls for hydroplanes, etc. (228,392.)
- 21,286. SOC. ANON. DES AVIONS M. WIBAULT. Aeroplane wings. (224,504.)

Published March 5, 1925

- 3,399. J. W. BURBIDGE. Screw propellers. (228,707.)
- 6,949. ROHRBACH-METALL-FLUGZEUG-BAU GES. Flying machines. (214,214.)

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